FIG. 1

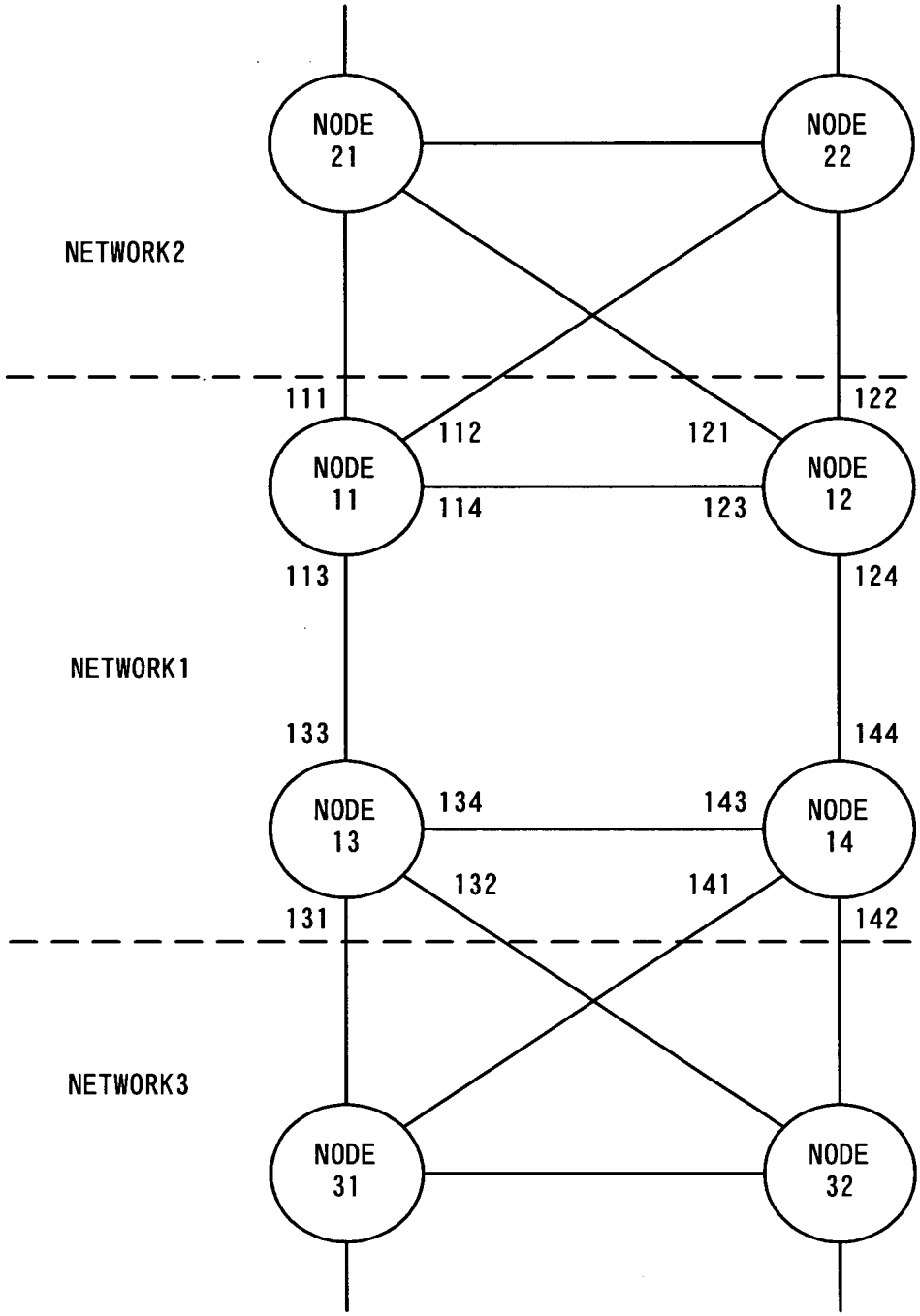

NODE 21
NODE 22
NETWORK2
111
112
121
122
NODE 11
NODE 12
114
123
113
124
NETWORK1
133
144
NODE 13
134
143
NODE 14
132
141
131
142
NETWORK3
NODE 31
NODE 32

FIG 2

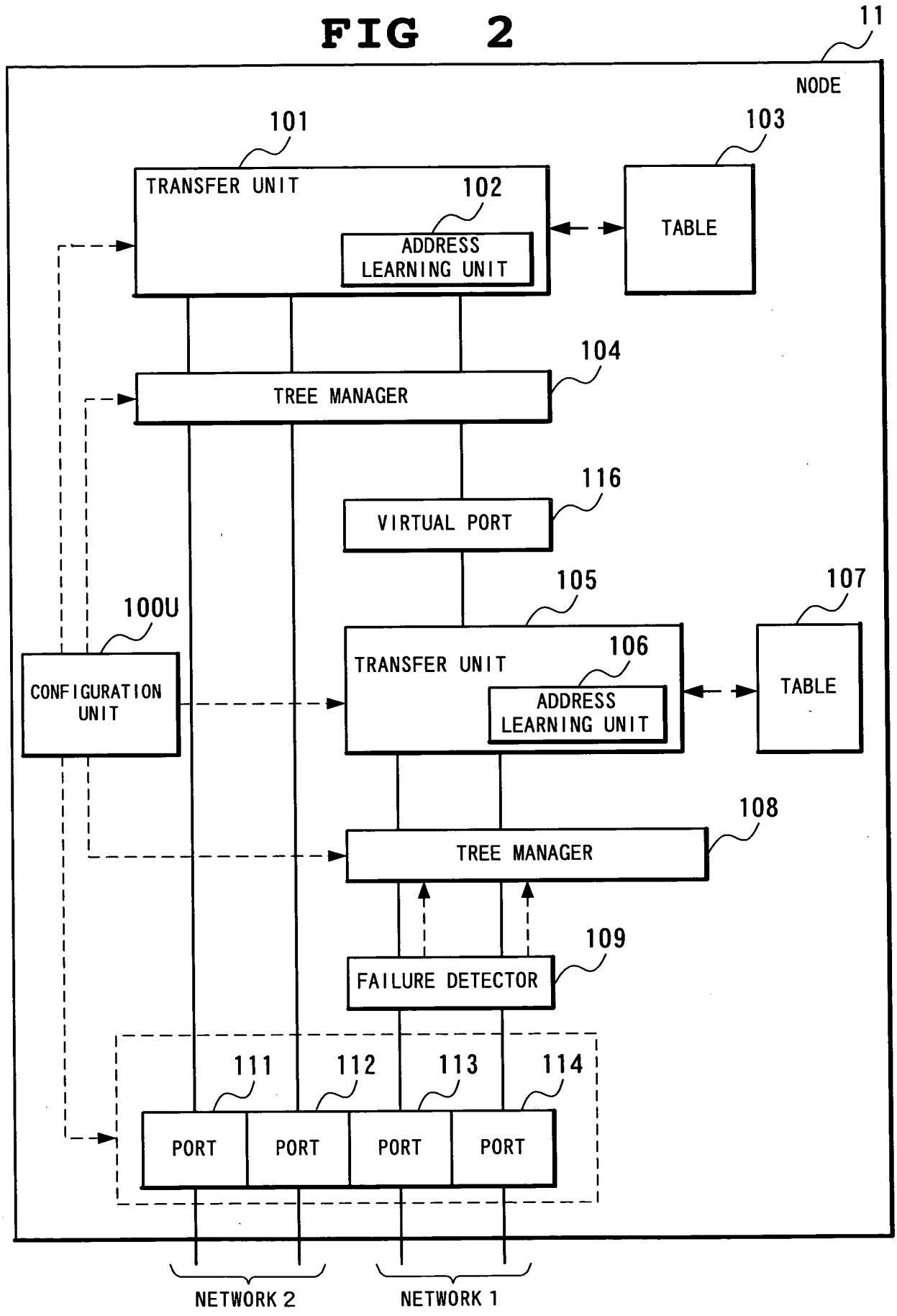
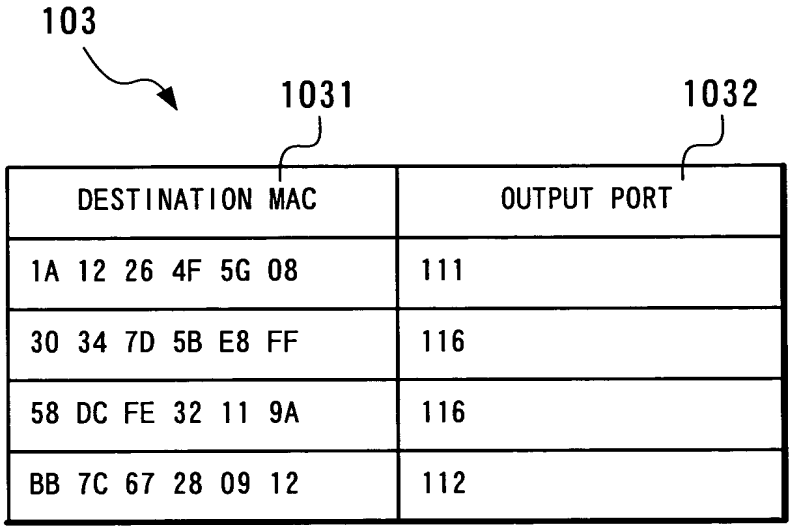

11
NODE
101
TRANSFER UNIT
102
ADDRESS LEARNING UNIT
103
TABLE
104
TREE MANAGER
116
VIRTUAL PORT
105
107
100U
CONFIGURATION UNIT
TRANSFER UNIT
106
ADDRESS LEARNING UNIT
TABLE
108
TREE MANAGER
109
FAILURE DETECTOR
111
112
113
114
PORT
PORT
PORT
PORT
NETWORK 2
NETWORK 1

FIG. 3



DESTINATION MAC	OUTPUT PORT
1A 12 26 4F 5G 08	111
30 34 7D 5B E8 FF	116
58 DC FE 32 11 9A	116
BB 7C 67 28 09 12	112

FIG. 4

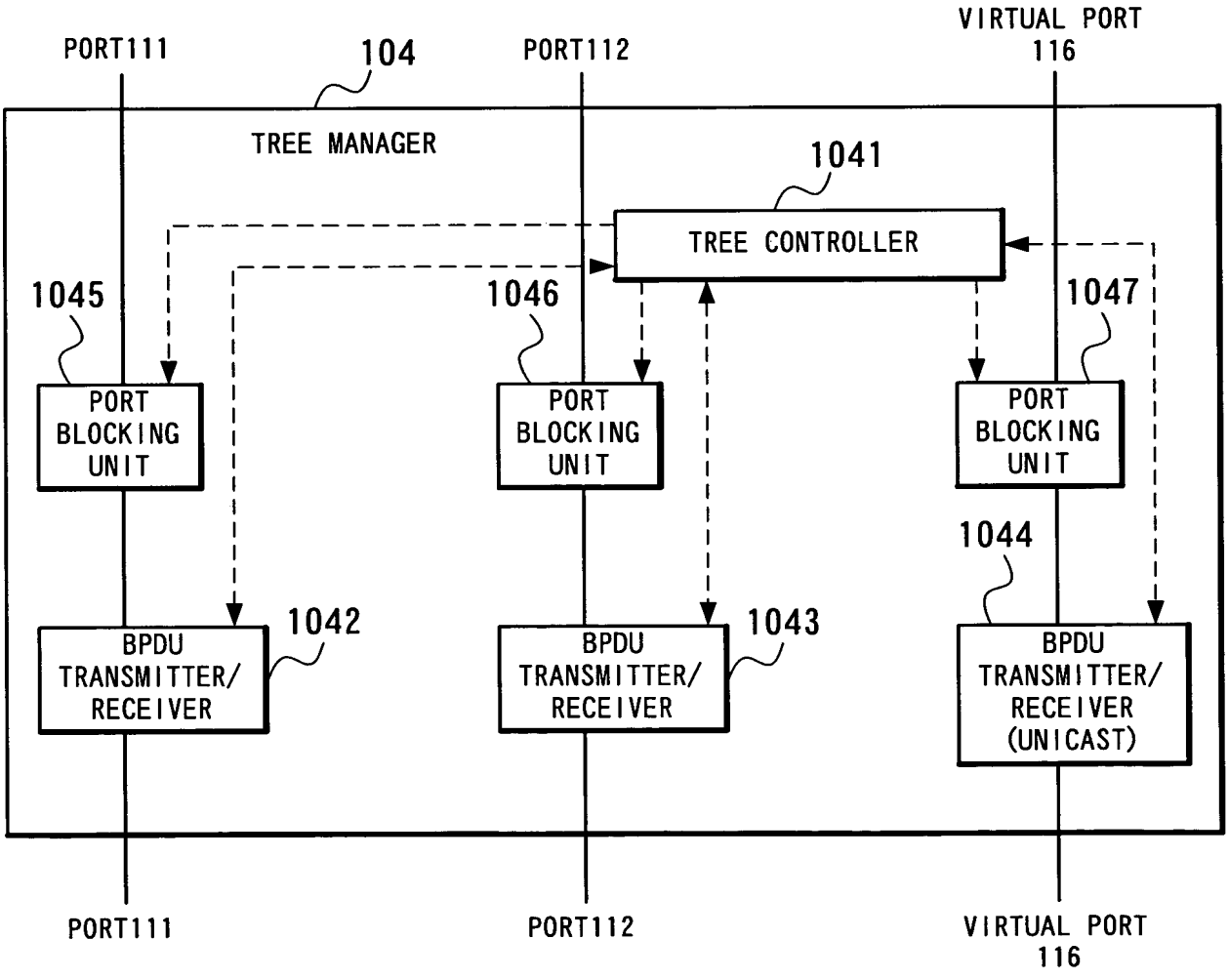


FIG. 5

107

1071

1072

DESTINATION MAC	OUTPUT PORT
1A 12 26 4F 5G 08	111
30 34 7D 5B E8 FF	113
58 DC FE 32 11 9A	114
BB 7C 67 28 09 12	116

FIG. 6

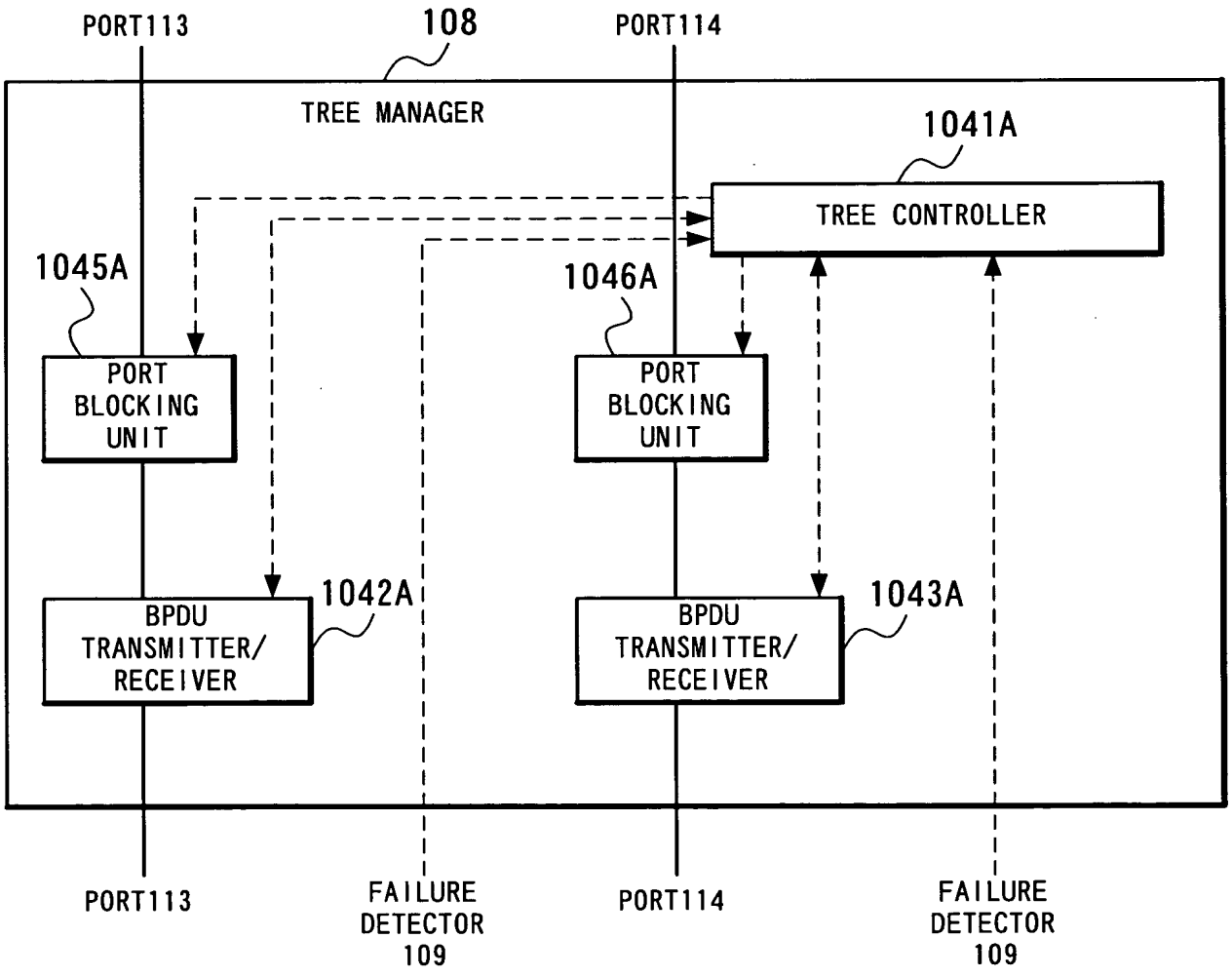


FIG 7

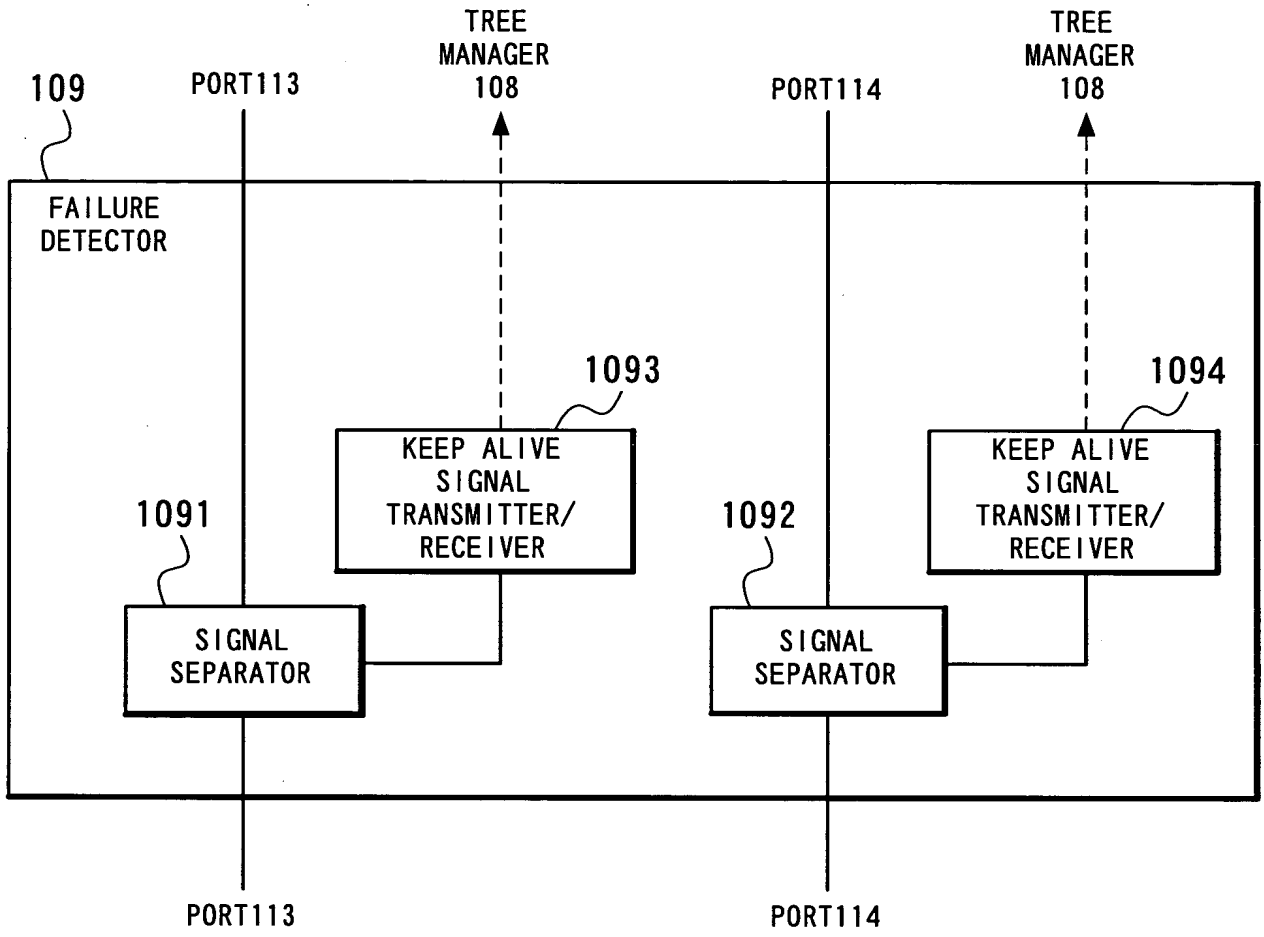

109
PORT113
TREE MANAGER 108
PORT114
TREE MANAGER 108
FAILURE DETECTOR
1093
1094
KEEP ALIVE SIGNAL TRANSMITTER/ RECEIVER
KEEP ALIVE SIGNAL TRANSMITTER/ RECEIVER
1091
1092
SIGNAL SEPARATOR
SIGNAL SEPARATOR
PORT113
PORT114

FIG. 8

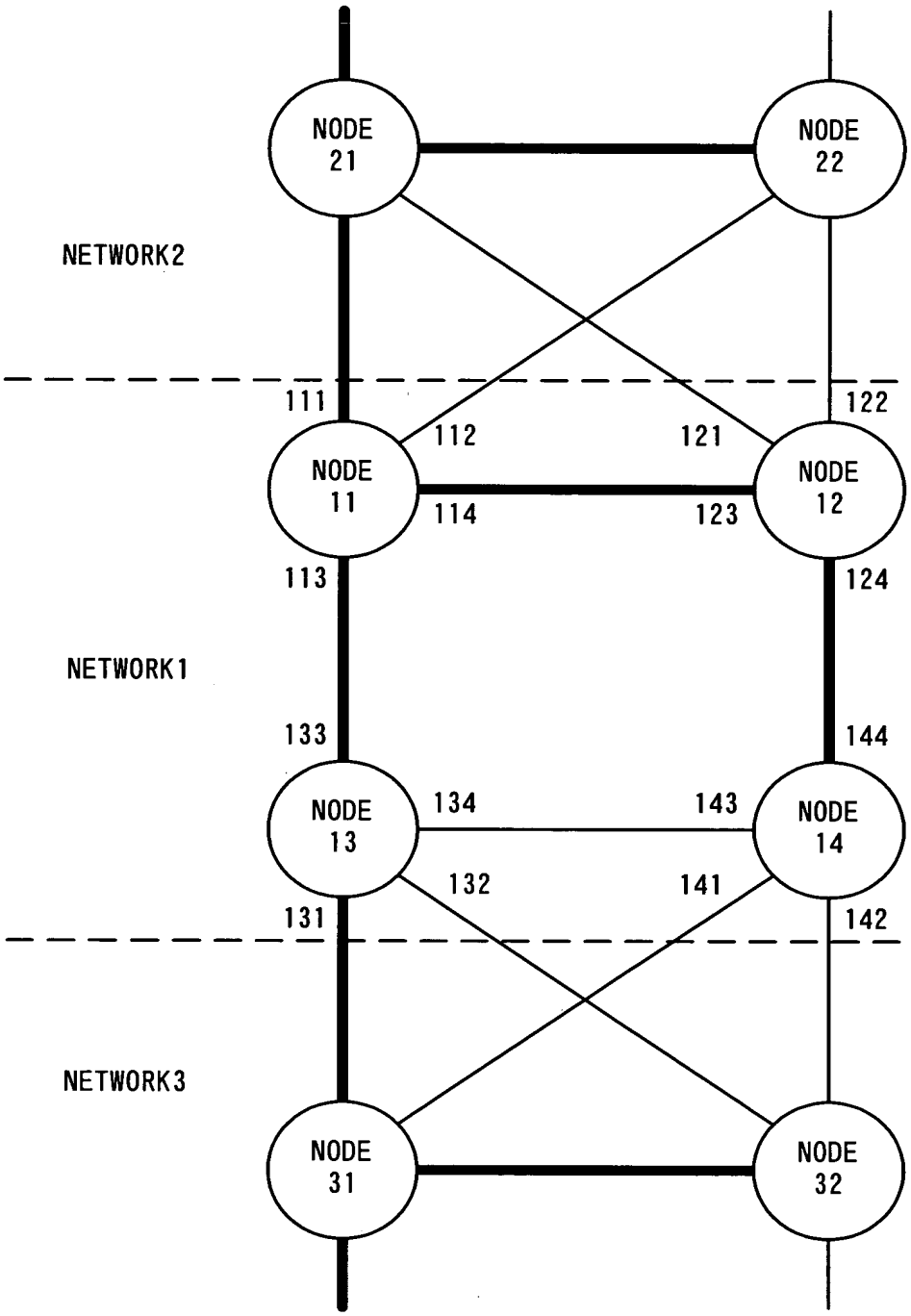

NODE 21
NODE 22
NETWORK2
111
122
112
121
NODE 11
NODE 12
114
123
113
124
NETWORK1
133
144
NODE 13
134
143
NODE 14
132
141
131
142
NETWORK3
NODE 31
NODE 32

FIG 9

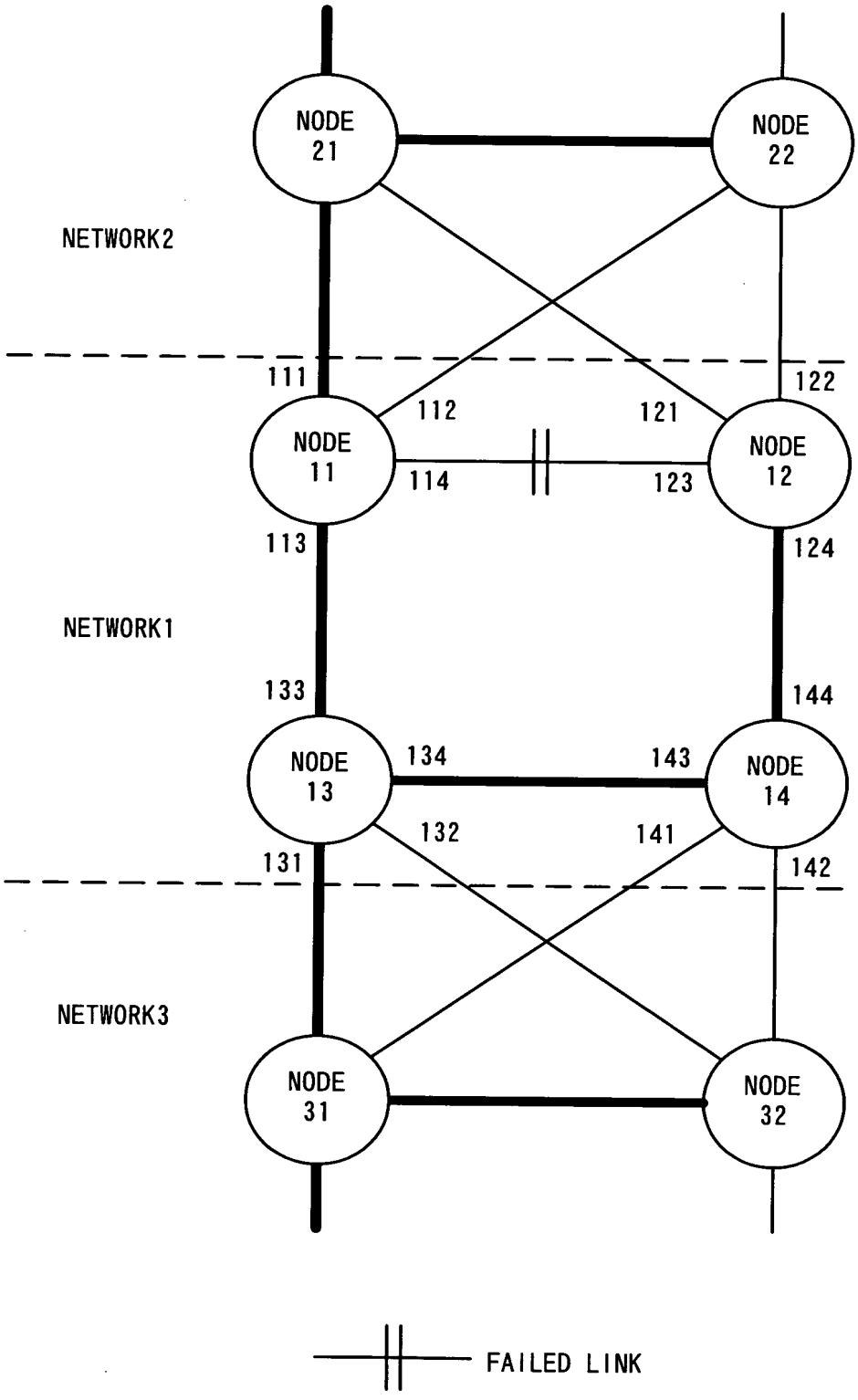

NODE 21
NODE 22
NETWORK2
111
122
112
121
NODE 11
NODE 12
114
123
113
124
NETWORK1
133
144
NODE 13
134
143
NODE 14
132
141
131
142
NETWORK3
NODE 31
NODE 32
FAILED LINK

FIG. 10

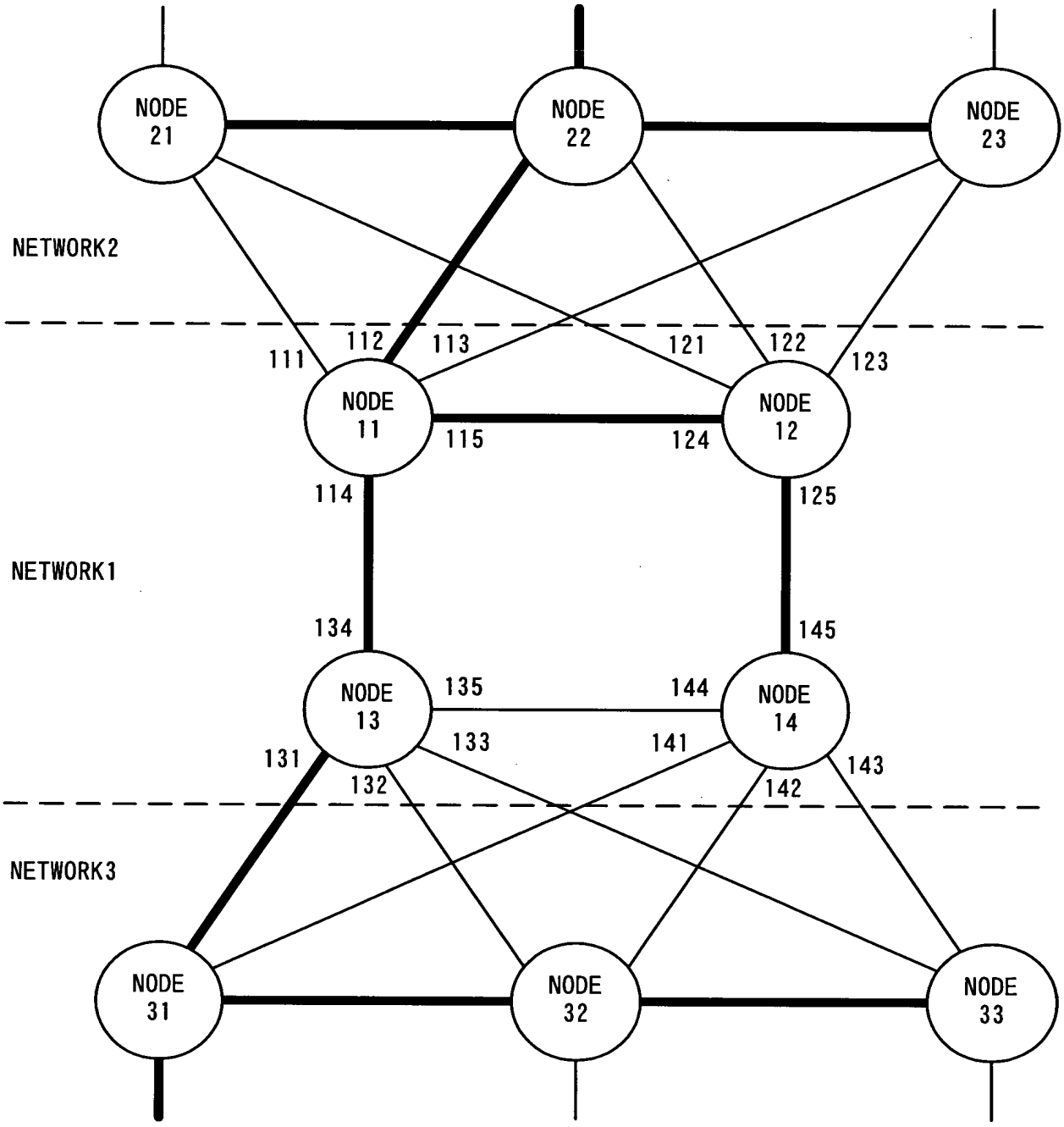

NODE 21
NODE 22
NODE 23
NETWORK2
111
112
113
121
122
123
NODE 11
NODE 12
115
124
114
125
NETWORK1
134
145
NODE 13
NODE 14
135
144
131
133
141
143
132
142
NETWORK3
NODE 31
NODE 32
NODE 33

FIG. 11

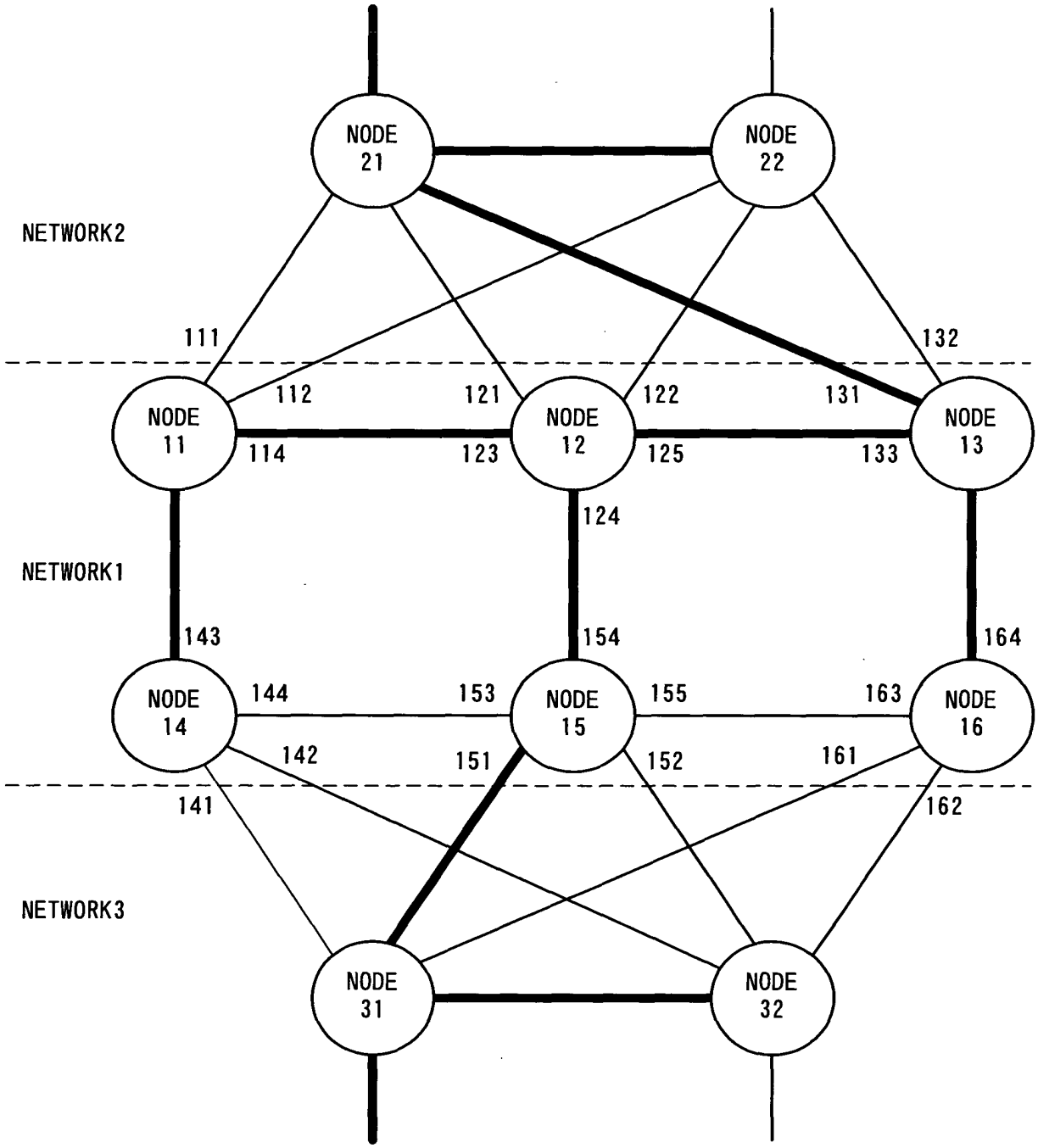

NETWORK2
NETWORK1
NETWORK3
NODE 21
NODE 22
NODE 11
NODE 12
NODE 13
NODE 14
NODE 15
NODE 16
NODE 31
NODE 32
111
112
114
121
123
122
125
131
132
133
124
141
142
143
144
151
153
152
154
155
161
162
163
164

FIG 12

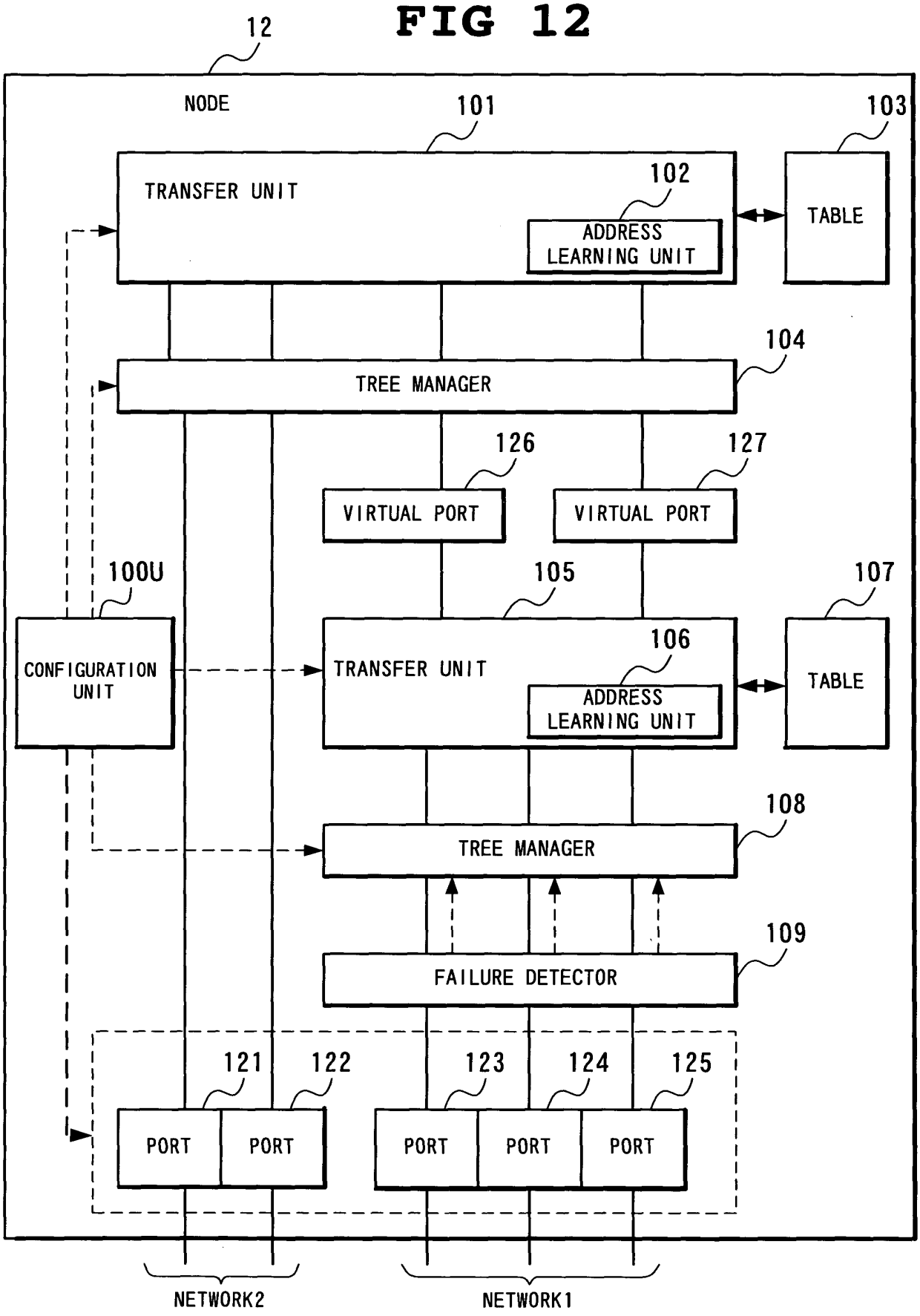

12
NODE
101
103
TRANSFER UNIT
102
ADDRESS LEARNING UNIT
TABLE
104
TREE MANAGER
126
127
VIRTUAL PORT
VIRTUAL PORT
100U
105
107
CONFIGURATION UNIT
TRANSFER UNIT
106
ADDRESS LEARNING UNIT
TABLE
108
TREE MANAGER
109
FAILURE DETECTOR
121
122
123
124
125
PORT
PORT
PORT
PORT
PORT
NETWORK2
NETWORK1

FIG.13

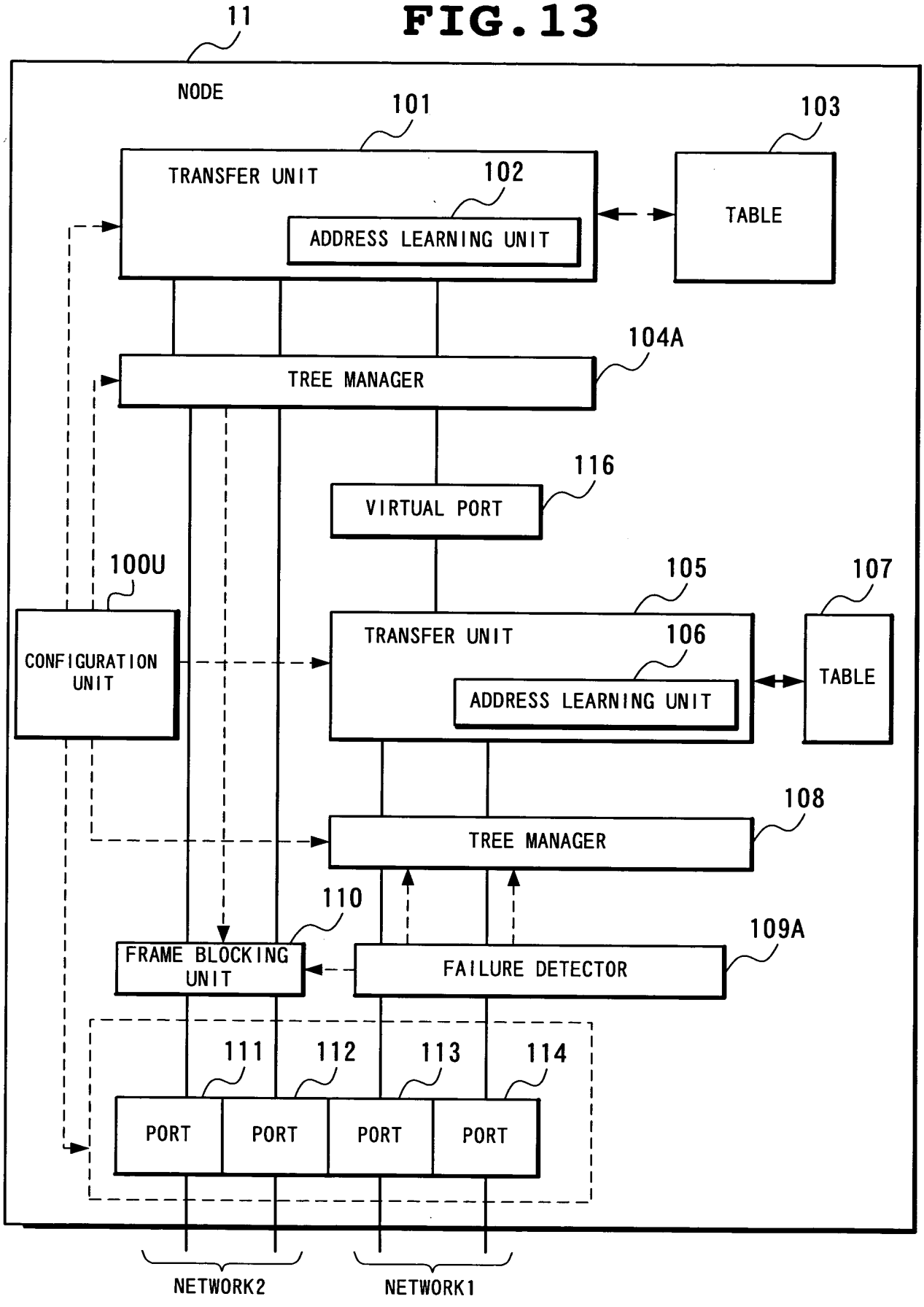

11
NODE
101
TRANSFER UNIT
102
ADDRESS LEARNING UNIT
103
TABLE
104A
TREE MANAGER
116
VIRTUAL PORT
100U
CONFIGURATION UNIT
105
TRANSFER UNIT
106
ADDRESS LEARNING UNIT
107
TABLE
108
TREE MANAGER
110
FRAME BLOCKING UNIT
109A
FAILURE DETECTOR
111
112
113
114
PORT
PORT
PORT
PORT
NETWORK2
NETWORK1

FIG.14

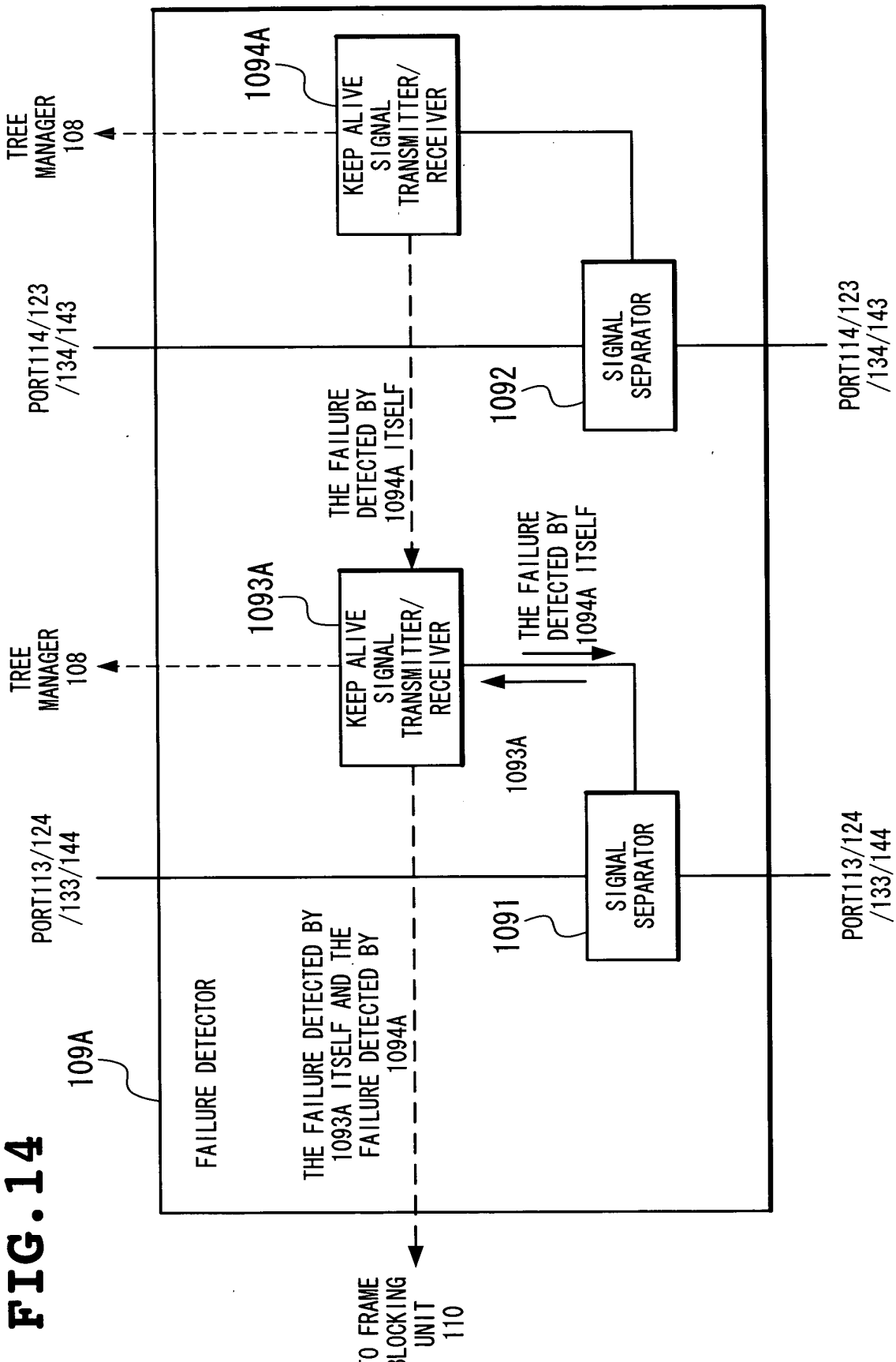

109A
FAILURE DETECTOR
PORT113/124
/133/144
PORT114/123
/134/143
TREE
MANAGER
108
1091
SIGNAL
SEPARATOR
1092
SIGNAL
SEPARATOR
1093A
KEEP ALIVE
SIGNAL
TRANSMITTER/
RECEIVER
1094A
KEEP ALIVE
SIGNAL
TRANSMITTER/
RECEIVER
THE FAILURE DETECTED BY
1093A ITSELF AND THE
FAILURE DETECTED BY
1094A
THE FAILURE
DETECTED BY
1094A ITSELF
THE FAILURE
DETECTED BY
1094A ITSELF
TO FRAME
BLOCKING
UNIT
110

FIG.15

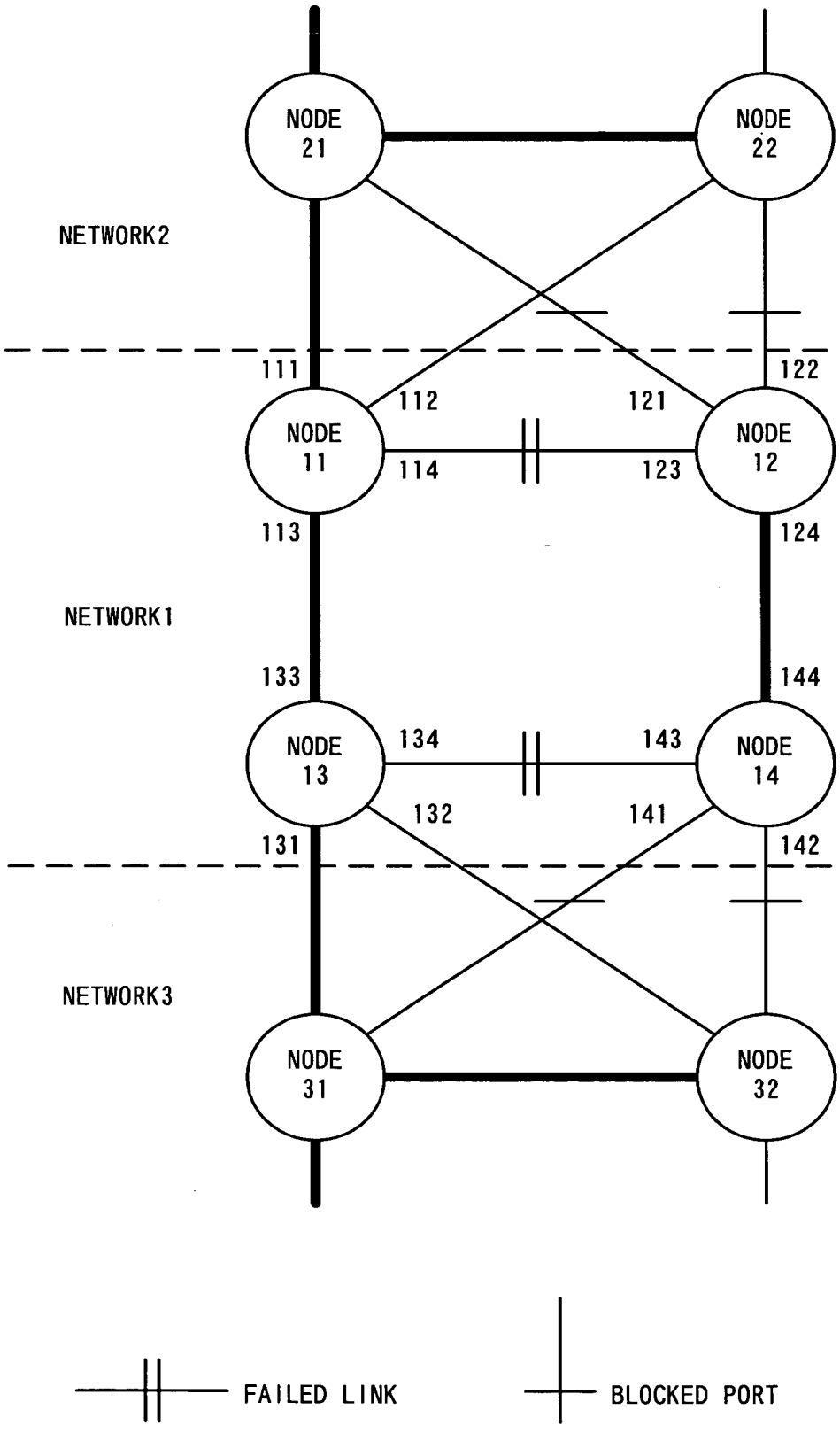

NODE 21
NODE 22
NETWORK2
111
122
112
121
NODE 11
NODE 12
114
123
113
124
NETWORK1
133
144
NODE 13
NODE 14
134
143
132
141
131
142
NETWORK3
NODE 31
NODE 32
FAILED LINK
BLOCKED PORT

FIG. 16

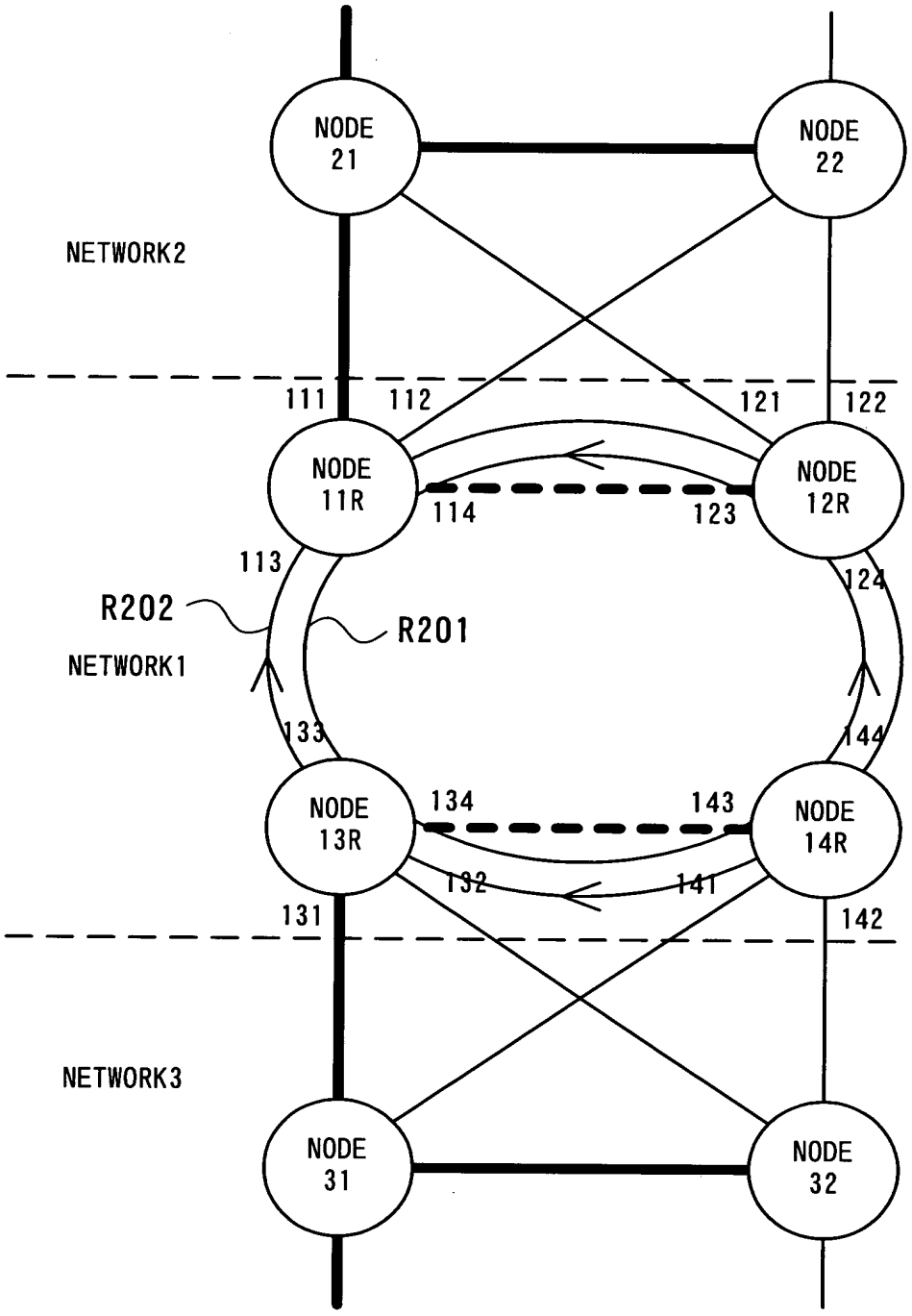

NODE 21
NODE 22
NETWORK2
111
112
121
122
NODE 11R
NODE 12R
114
123
113
124
R202
R201
NETWORK1
133
144
NODE 13R
NODE 14R
134
143
132
141
131
142
NETWORK3
NODE 31
NODE 32

FIG. 17

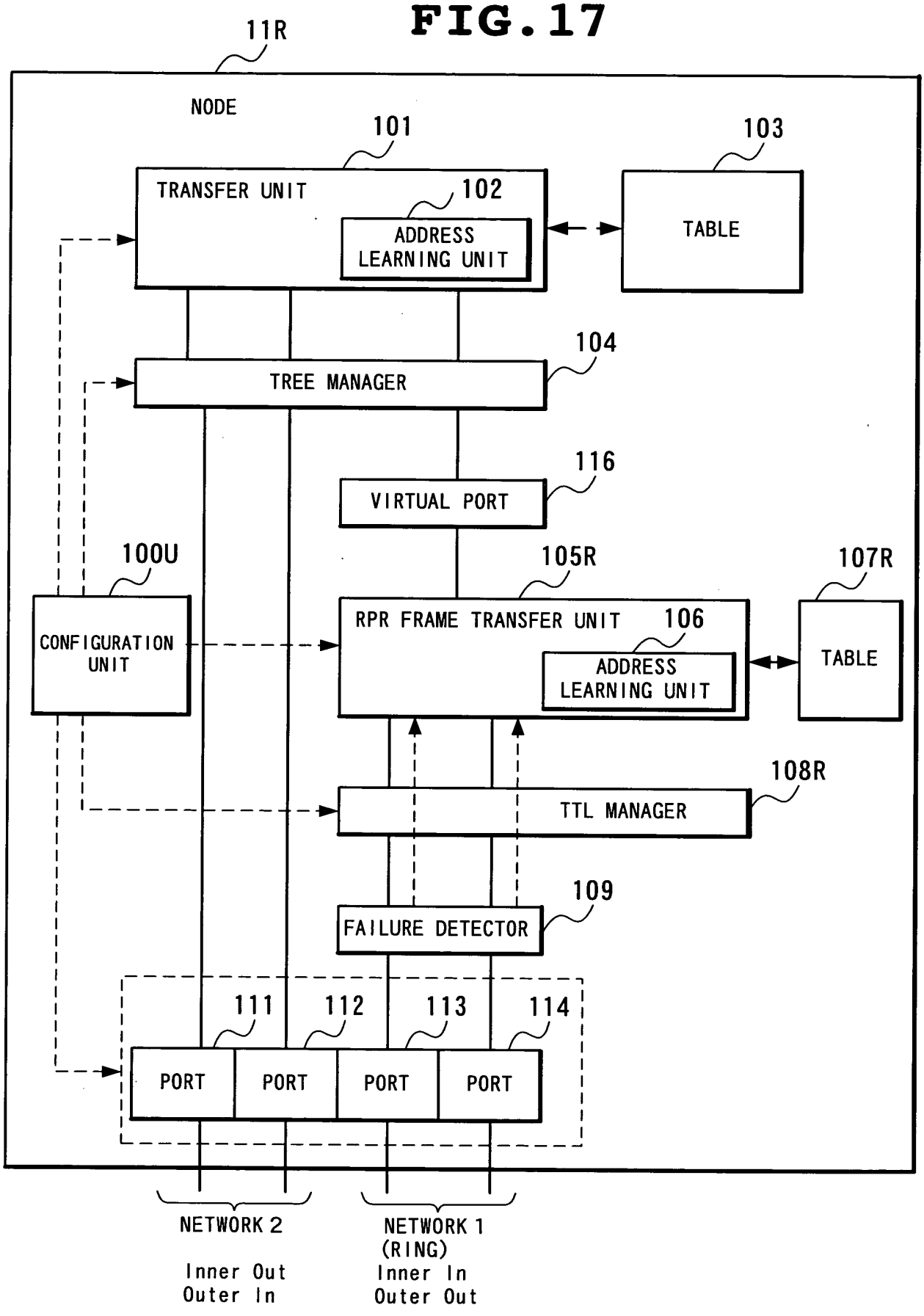

11R
NODE
101
TRANSFER UNIT
102
ADDRESS LEARNING UNIT
103
TABLE
104
TREE MANAGER
116
VIRTUAL PORT
100U
CONFIGURATION UNIT
105R
RPR FRAME TRANSFER UNIT
106
ADDRESS LEARNING UNIT
107R
TABLE
108R
TTL MANAGER
109
FAILURE DETECTOR
111
112
113
114
PORT
PORT
PORT
PORT
NETWORK 2
Inner Out
Outer In
NETWORK 1
(RING)
Inner In
Outer Out

FIG.18

107R

1071 DESTINATION MAC	1071R DESTINATION RPR NODE	1072R RING ID	1072 OUTPUT PORT	
01 80 C2 00 00 00	1 2 R	Outer	1 1 4	PREVIOUSLY SET
30 34 7D 5B E8 FF	1 3 R	Inner	1 1 3	EXAMPLE
58 DC FE 32 11 9A	1 2 R	Outer	1 1 4	EXAMPLE
BB 7C 67 28 09 12	1 1 R	DELETE	1 1 6	EXAMPLE

FIG.19

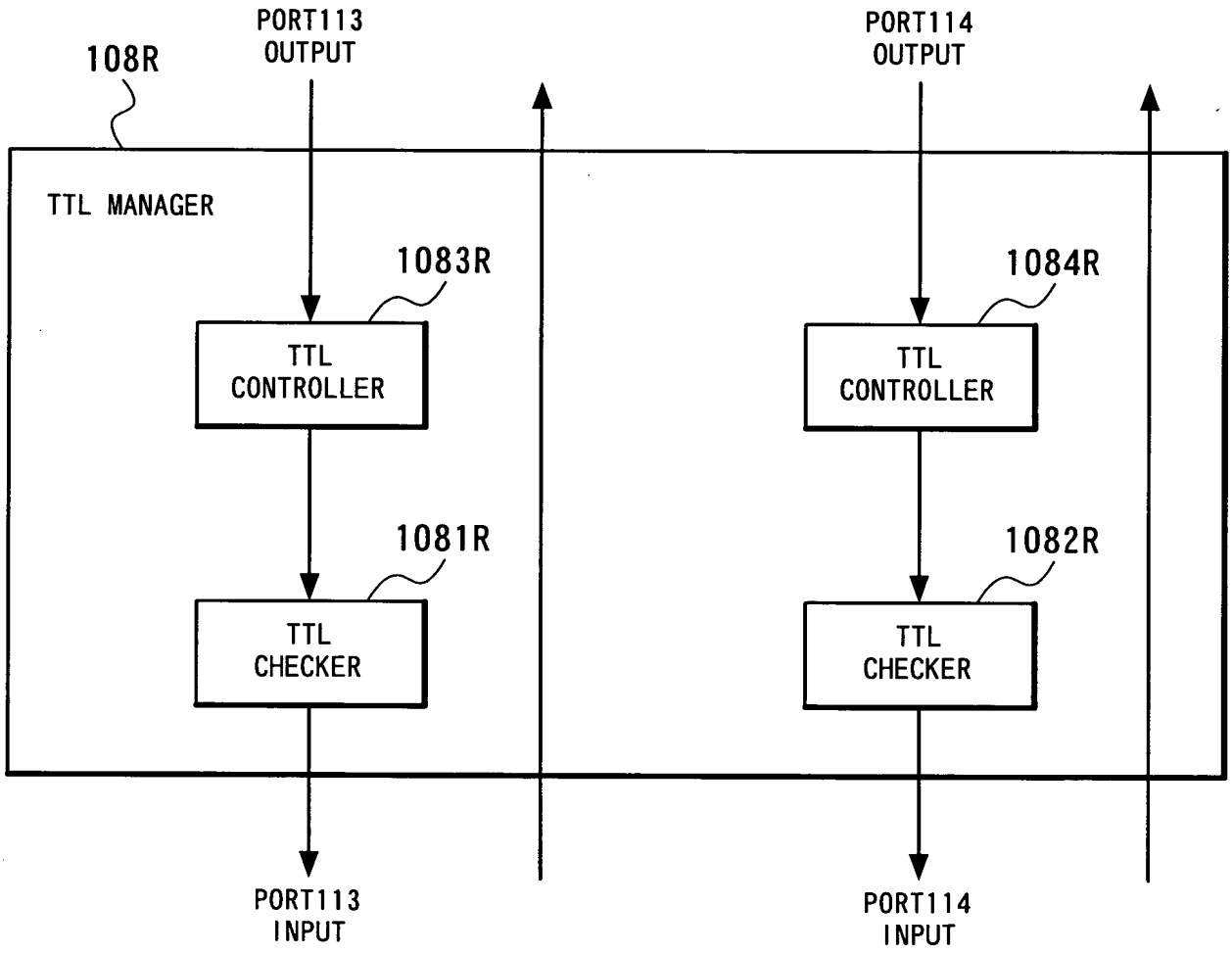


FIG 20

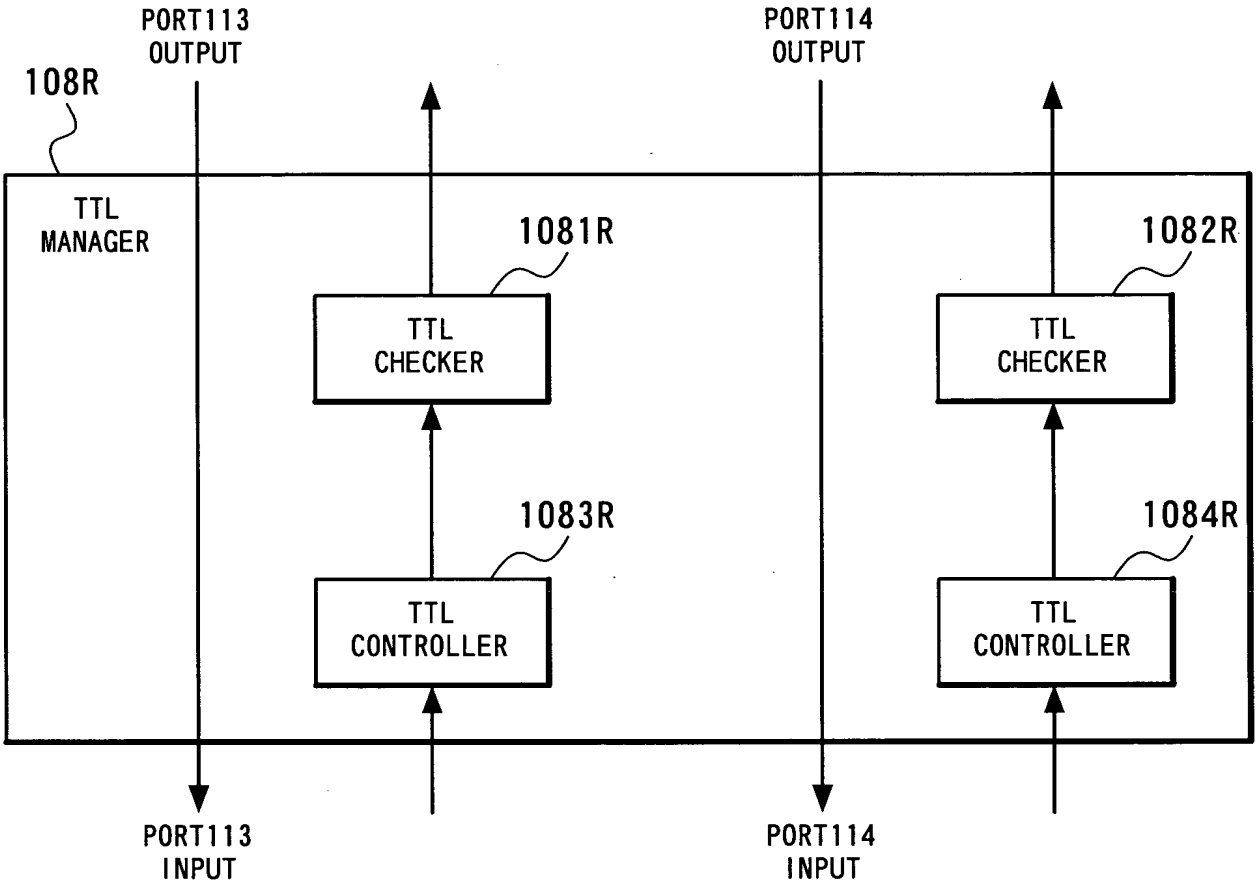

PORT113
OUTPUT
PORT114
OUTPUT
108R
TTL
MANAGER
1081R
1082R
TTL
CHECKER
TTL
CHECKER
1083R
1084R
TTL
CONTROLLER
TTL
CONTROLLER
PORT113
INPUT
PORT114
INPUT

FIG.21

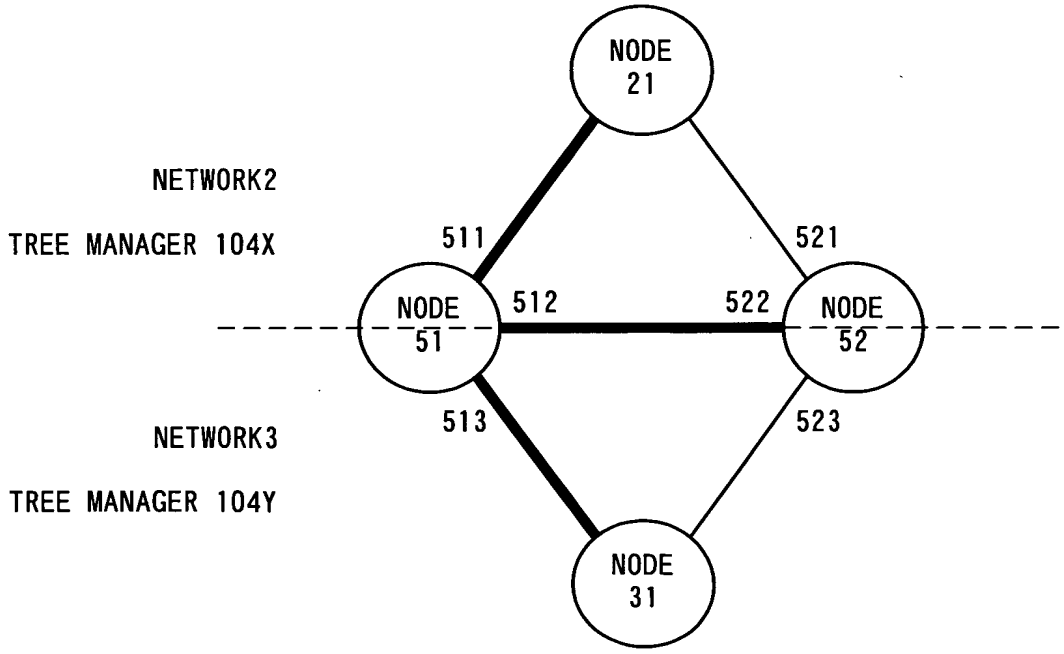

NODE
21
NETWORK2
TREE MANAGER 104X
511
521
NODE
51
512
522
NODE
52
513
523
NETWORK3
TREE MANAGER 104Y
NODE
31

FIG.22

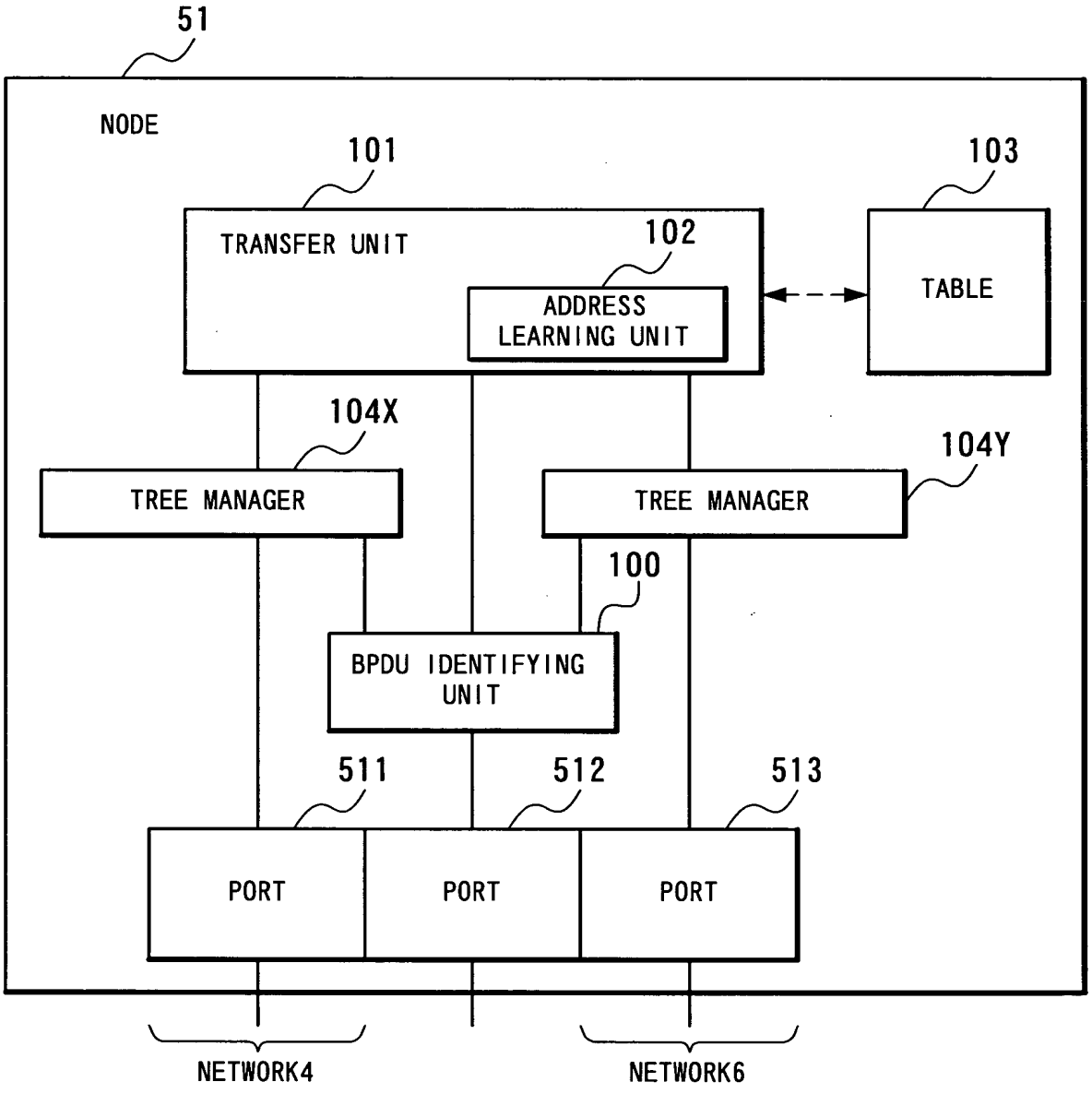

51
NODE
101
TRANSFER UNIT
102
ADDRESS LEARNING UNIT
103
TABLE
104X
TREE MANAGER
104Y
TREE MANAGER
100
BPDU IDENTIFYING UNIT
511
512
513
PORT
PORT
PORT
NETWORK4
NETWORK6

FIG.23

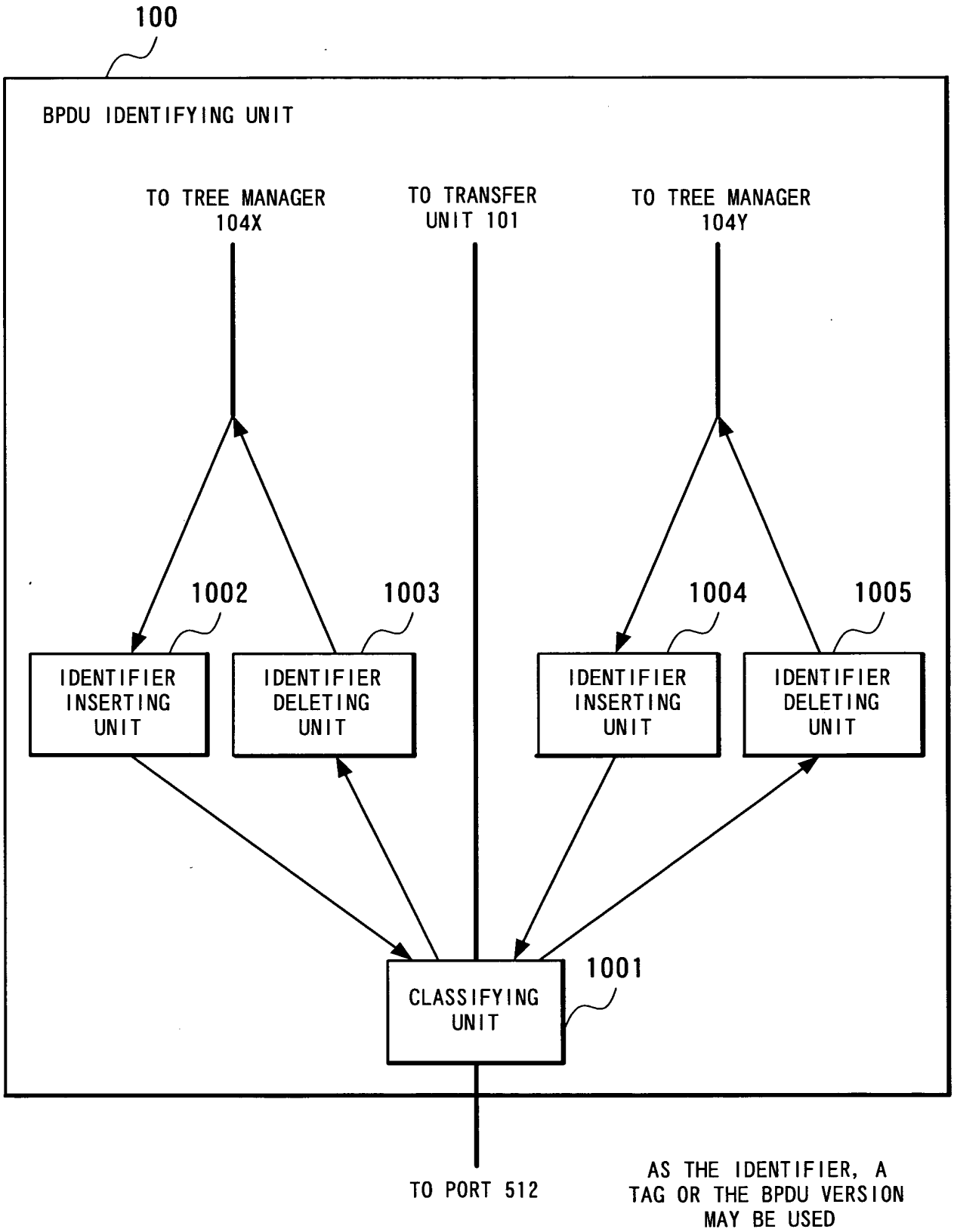

100
BPDU IDENTIFYING UNIT
TO TREE MANAGER 104X
TO TRANSFER UNIT 101
TO TREE MANAGER 104Y
1002
1003
1004
1005
IDENTIFIER INSERTING UNIT
IDENTIFIER DELETING UNIT
IDENTIFIER INSERTING UNIT
IDENTIFIER DELETING UNIT
1001
CLASSIFYING UNIT
TO PORT 512
AS THE IDENTIFIER, A TAG OR THE BPDU VERSION MAY BE USED

FIG.24

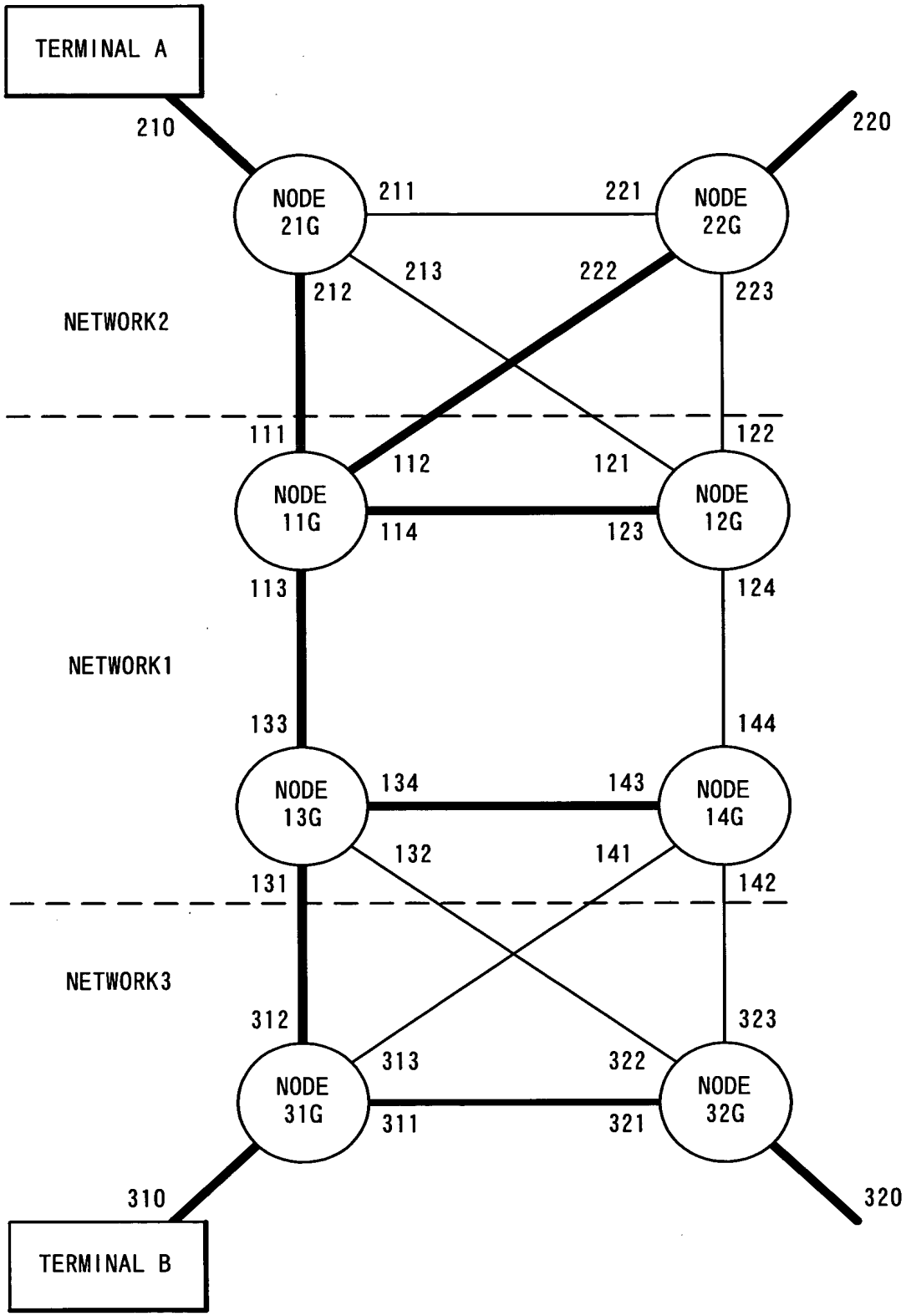

TERMINAL A
210
220
NODE 21G
211
221
NODE 22G
213
222
212
223
NETWORK2
111
122
112
121
NODE 11G
NODE 12G
114
123
113
124
NETWORK1
133
144
NODE 13G
134
143
NODE 14G
132
141
131
142
NETWORK3
312
323
313
322
NODE 31G
NODE 32G
311
321
310
320
TERMINAL B

FIG.25

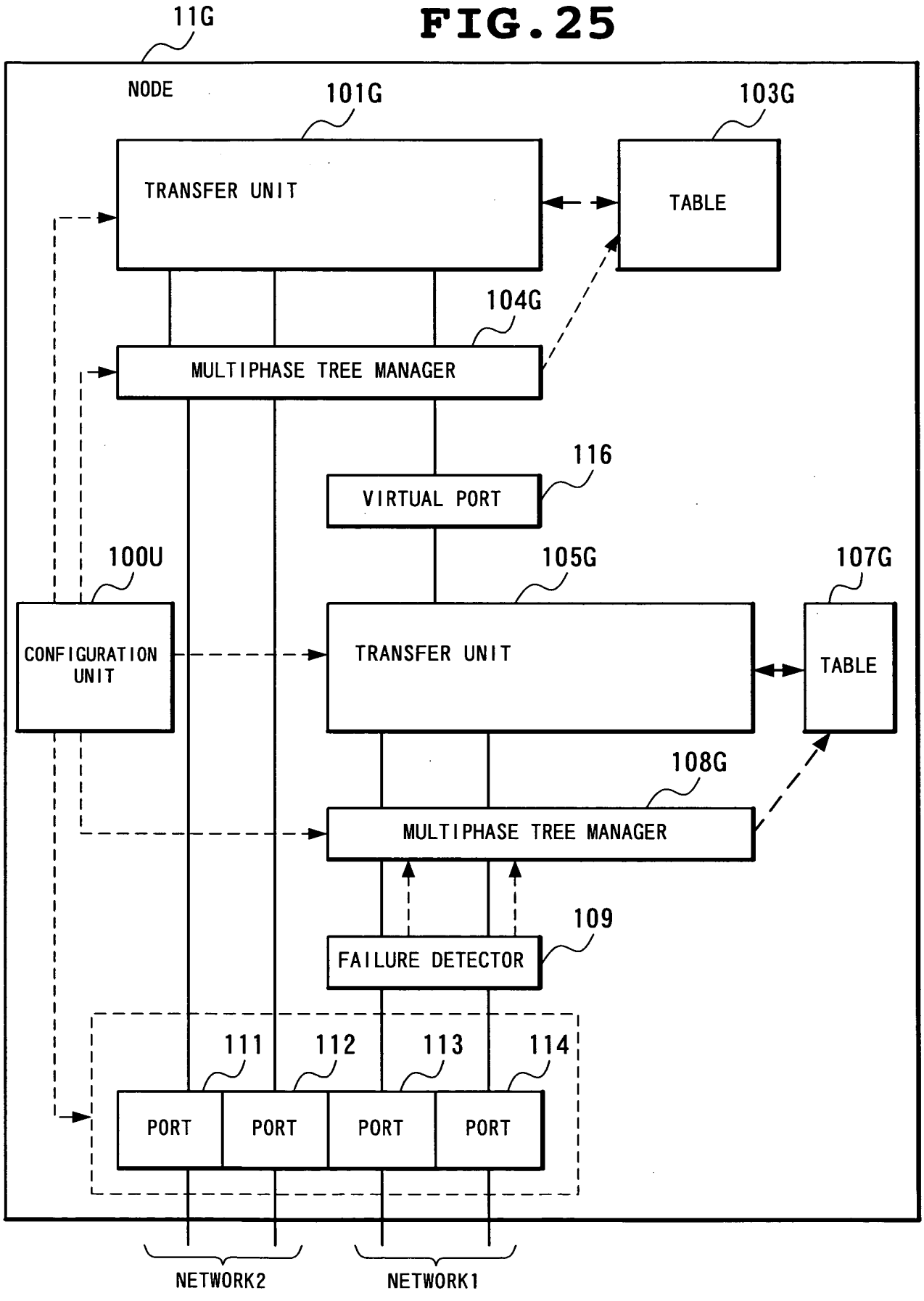

11G
NODE
101G
TRANSFER UNIT
103G
TABLE
104G
MULTIPHASE TREE MANAGER
116
VIRTUAL PORT
100U
CONFIGURATION UNIT
105G
TRANSFER UNIT
107G
TABLE
108G
MULTIPHASE TREE MANAGER
109
FAILURE DETECTOR
111
112
113
114
PORT
PORT
PORT
PORT
NETWORK2
NETWORK1

FIG.26

103G

1031G

1032G

DESTINATION IDENTIFIER TAG	OUTPUT PORT
0 0 0 0	1 1 1
0 0 3 1	1 1 6
0 1 5 6	1 1 6
4 0 9 5	1 1 2

FIG.27

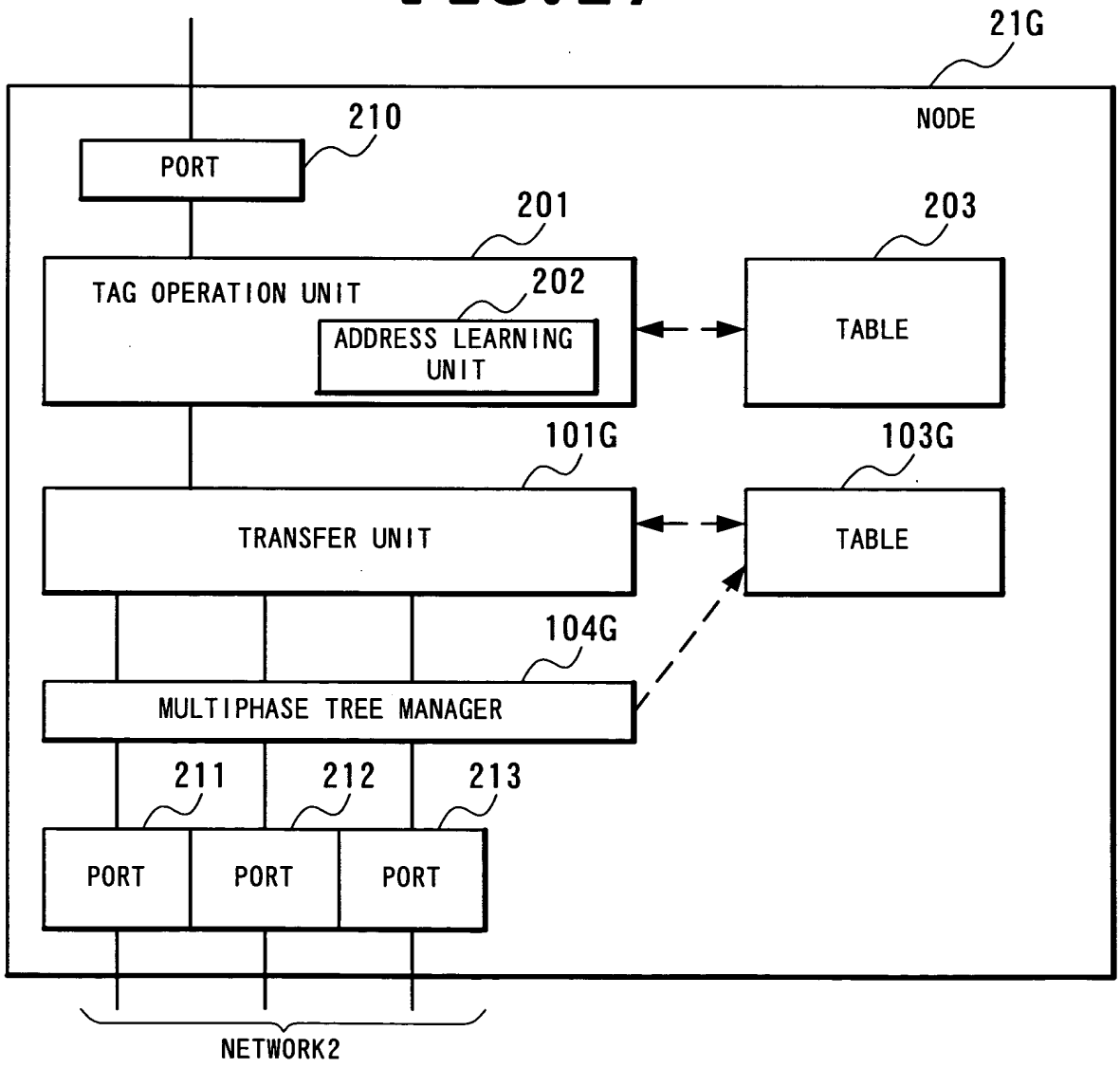
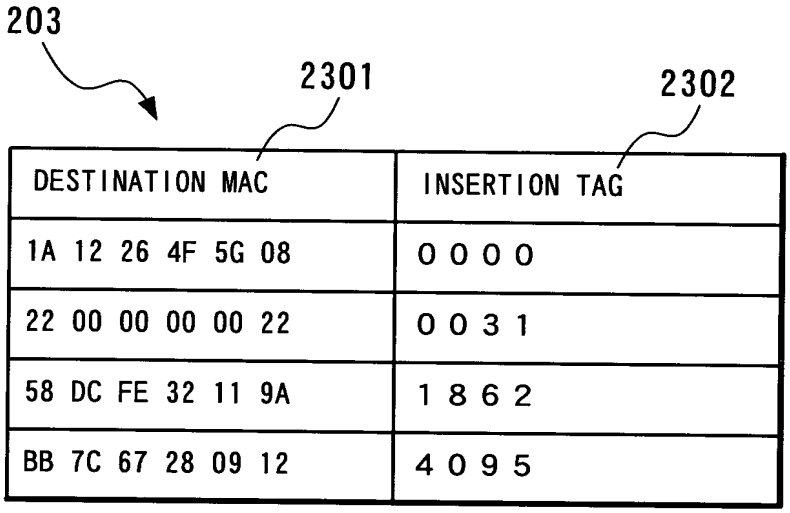


FIG.28



DESTINATION MAC	INSERTION TAG
1A 12 26 4F 5G 08	0000
22 00 00 00 00 22	0031
58 DC FE 32 11 9A	1862
BB 7C 67 28 09 12	4095

FIG.29

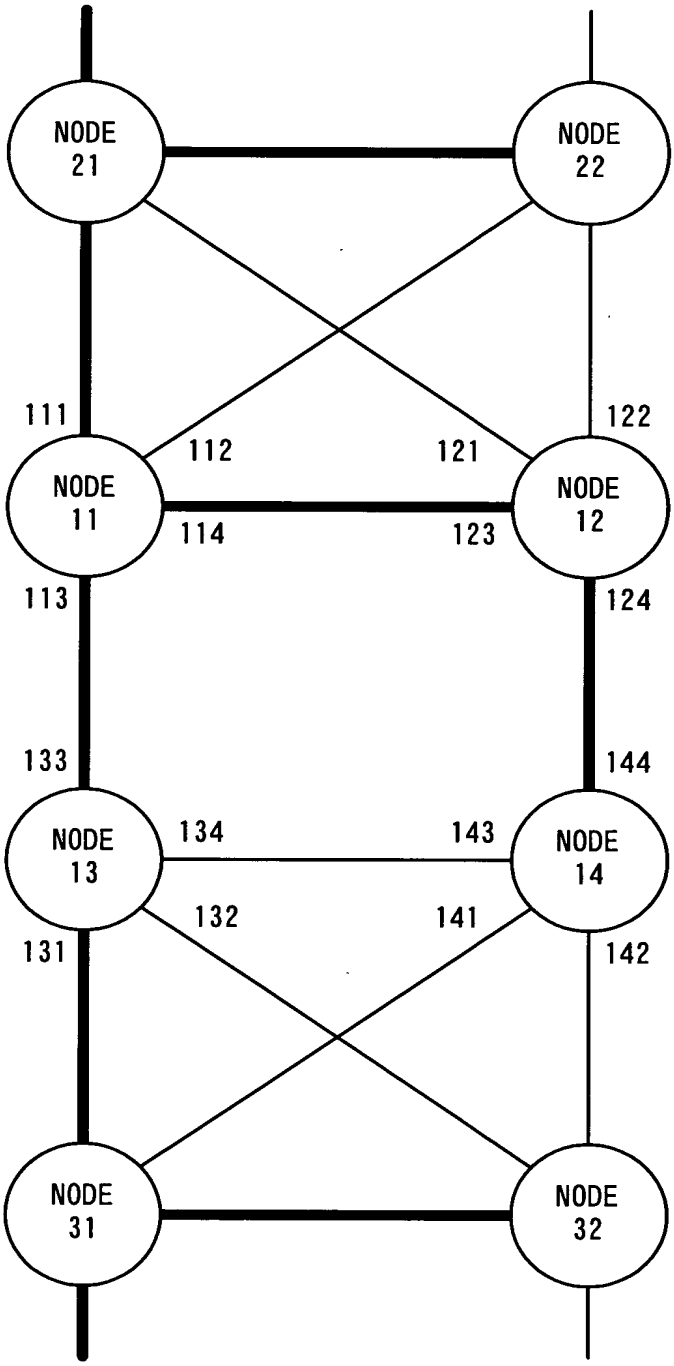
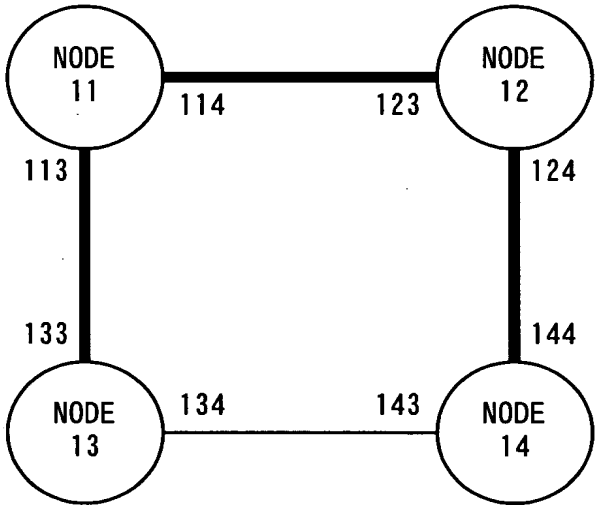
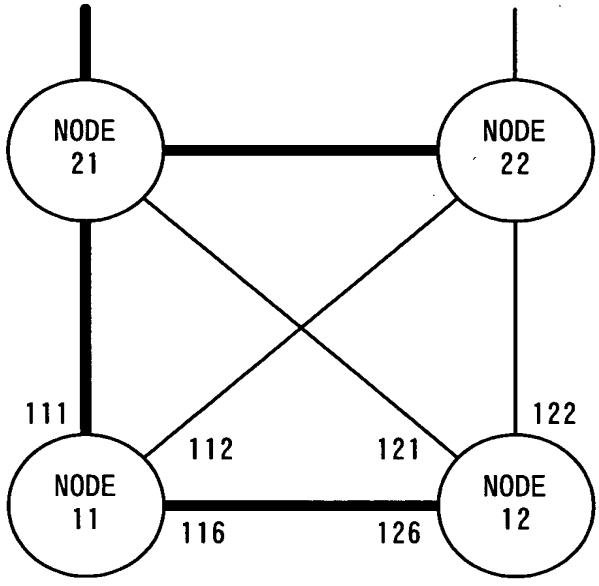

NODE 21
NODE 22
111
112
121
122
NODE 11
NODE 12
114
123
113
124
133
144
NODE 13
NODE 14
134
143
132
141
131
142
NODE 31
NODE 32

FIG.30A



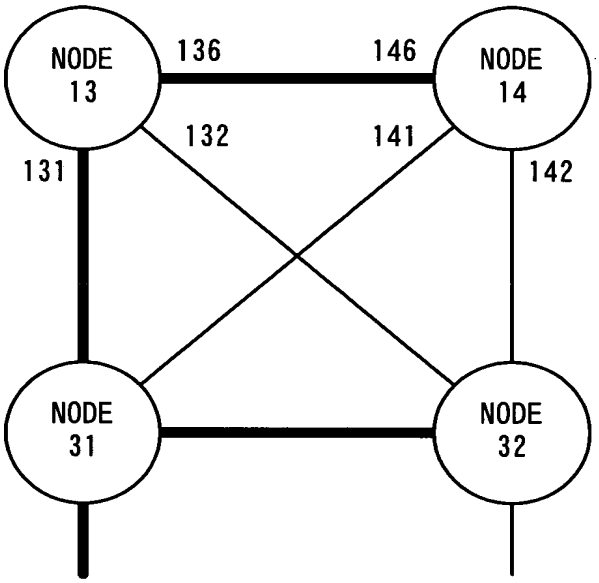
NETWORK1

FIG.30B



NETWORK2

FIG.30C



NETWORK3

FIG.31

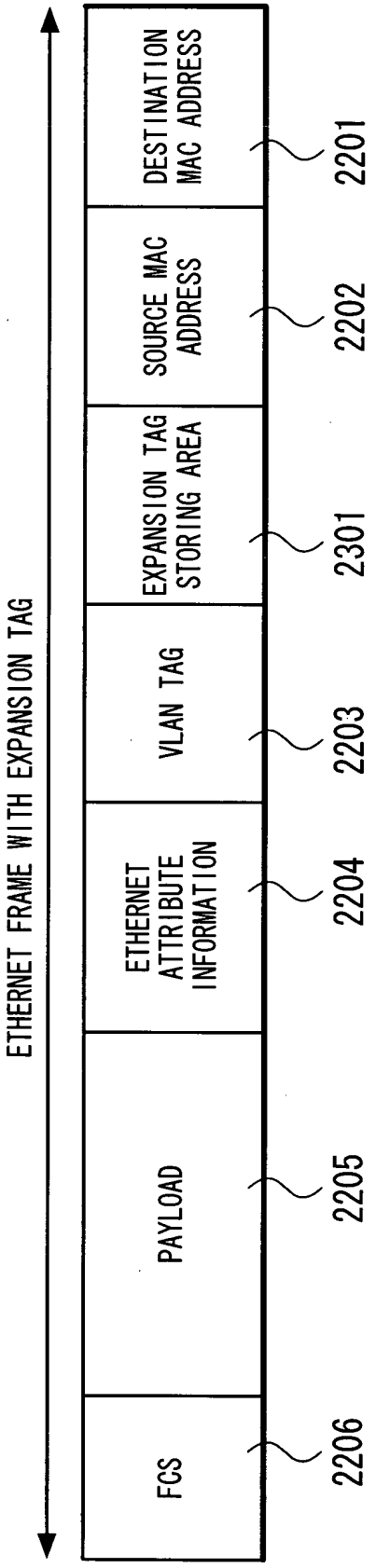

ETHERNET FRAME WITH EXPANSION TAG
DESTINATION MAC ADDRESS
SOURCE MAC ADDRESS
EXPANSION TAG STORING AREA
VLAN TAG
ETHERNET ATTRIBUTE INFORMATION
PAYLOAD
FCS
2201
2202
2301
2203
2204
2205
2206

FIG.32

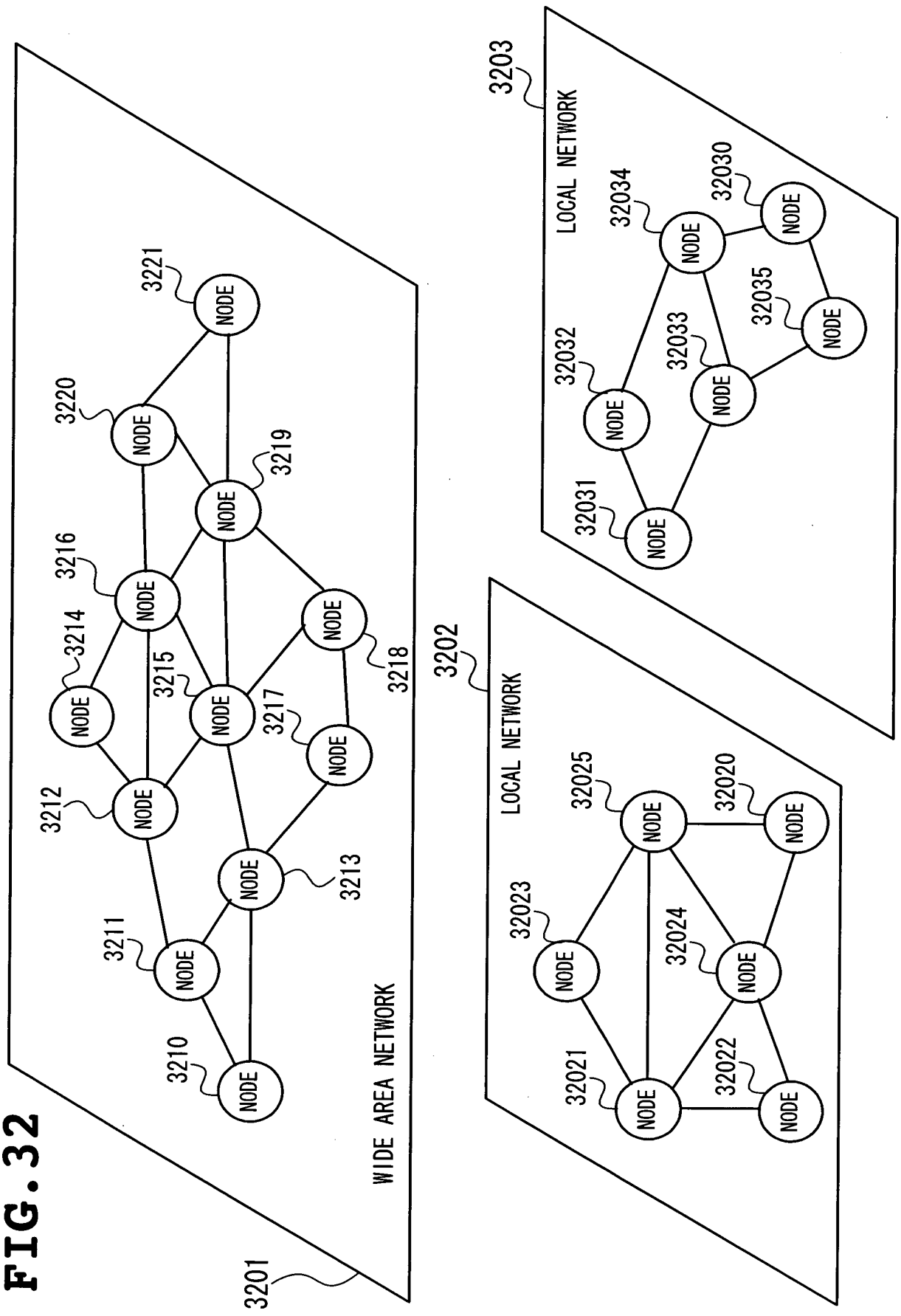

3201
WIDE AREA NETWORK
3202
LOCAL NETWORK
3203
LOCAL NETWORK
NODE
3210
3211
3212
3213
3214
3215
3216
3217
3218
3219
3220
3221
32020
32021
32022
32023
32024
32025
32030
32031
32032
32033
32034
32035

FIG.33

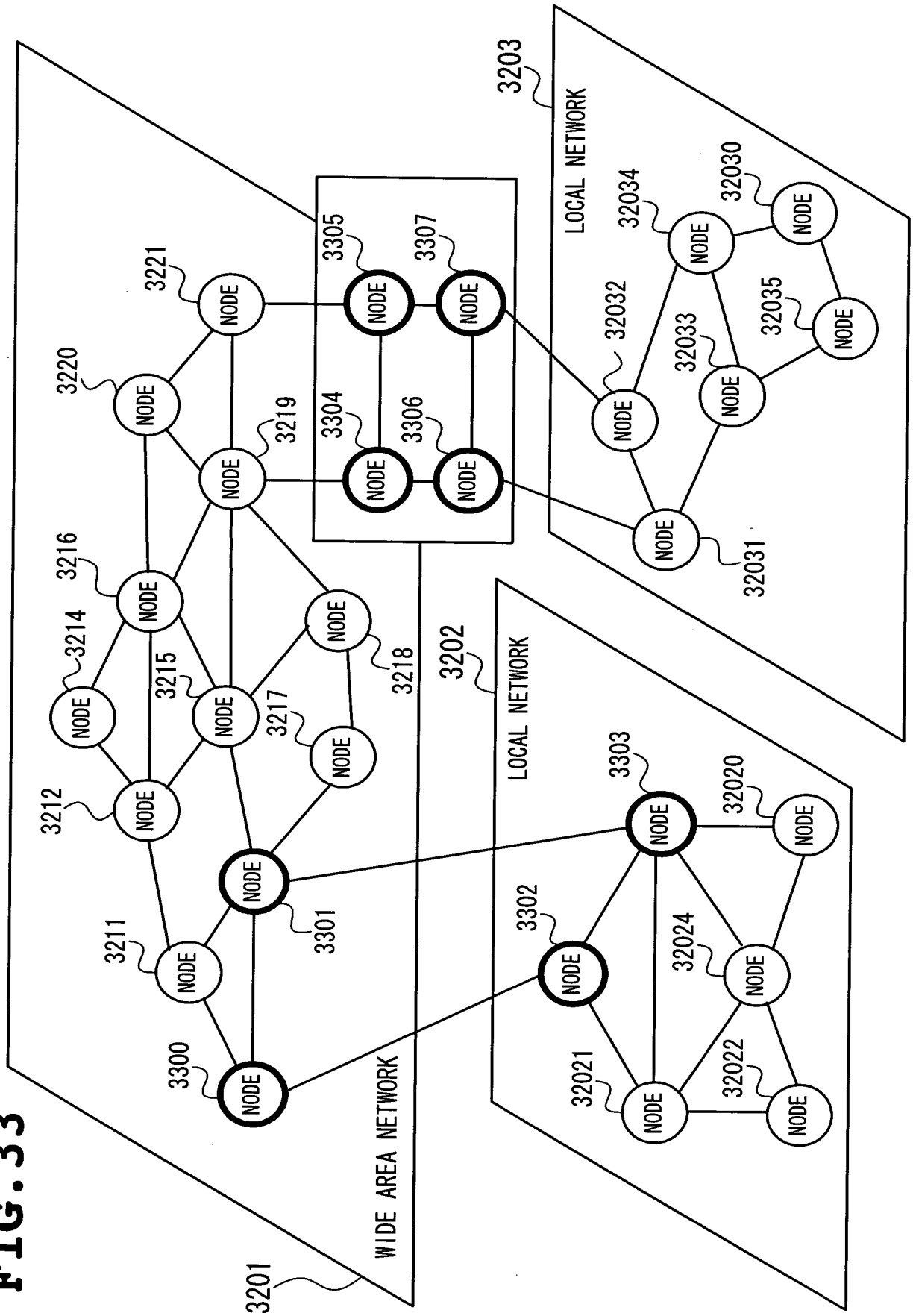

3201
WIDE AREA NETWORK
3202
LOCAL NETWORK
3203
LOCAL NETWORK
NODE
3300
3301
3302
3303
3304
3305
3306
3307
3211
3212
3214
3215
3216
3217
3218
3219
3220
3221
32020
32021
32022
32024
32030
32031
32032
32033
32034
32035

FIG.34

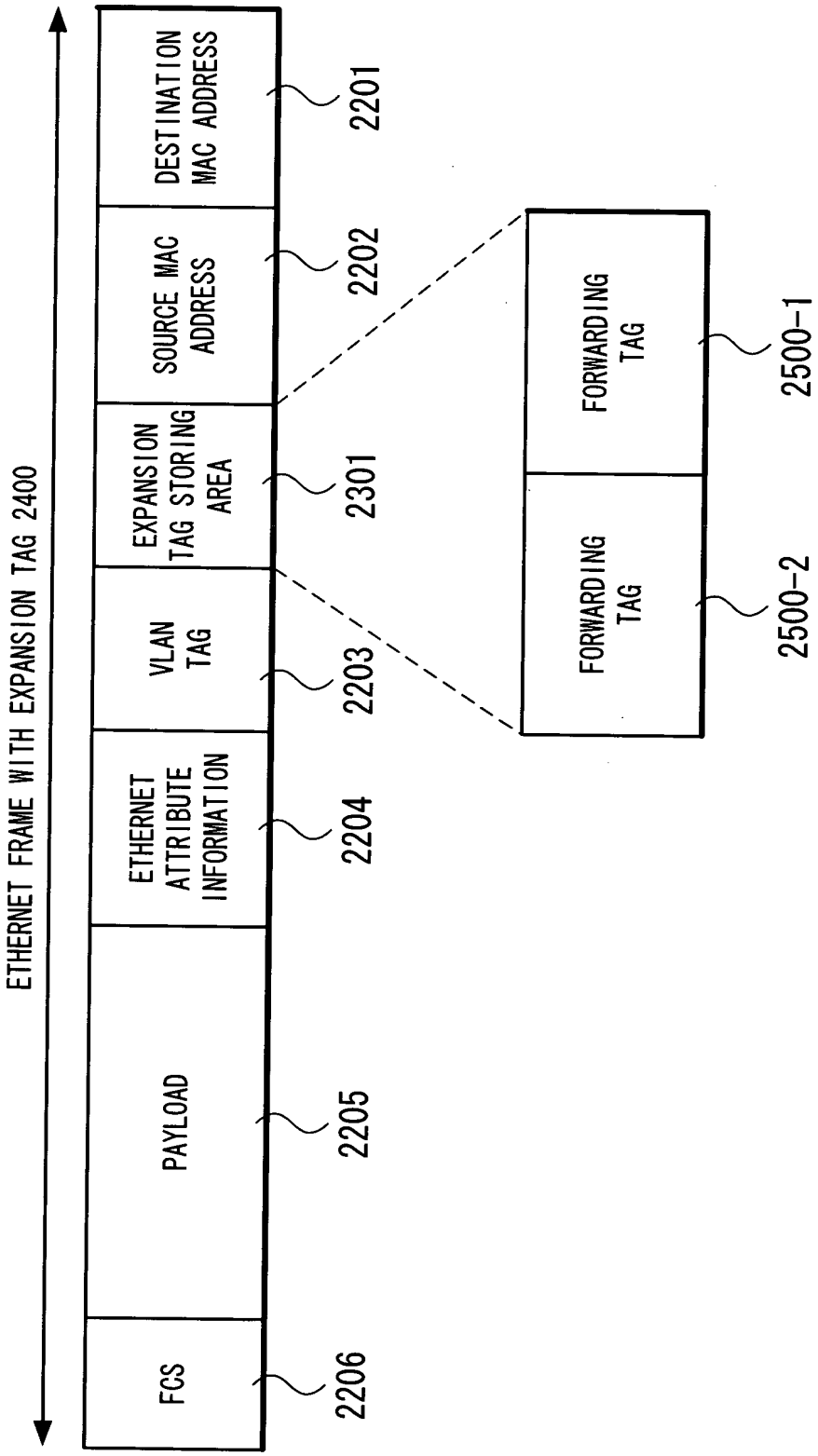
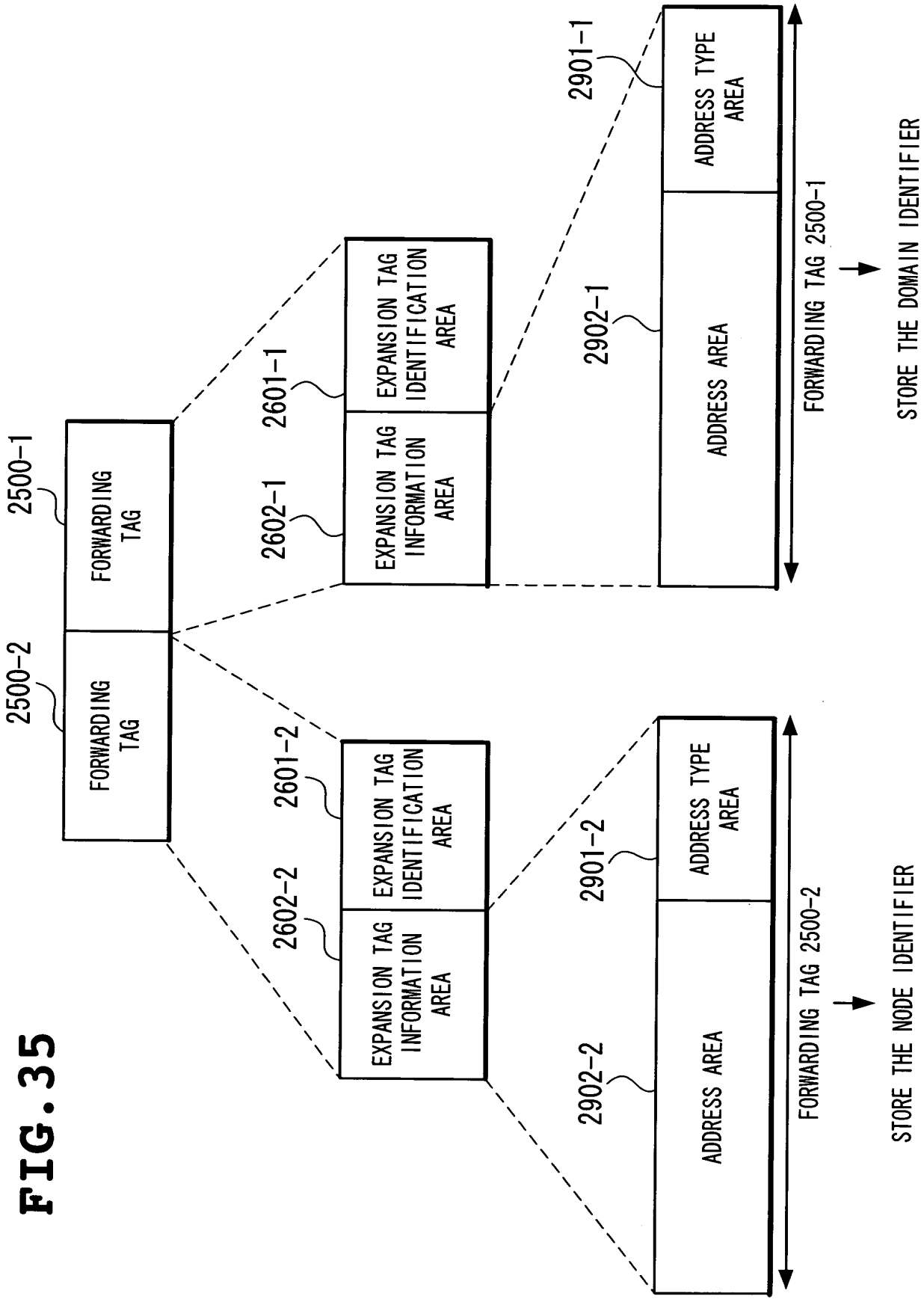

ETHERNET FRAME WITH EXPANSION TAG 2400
DESTINATION MAC ADDRESS
SOURCE MAC ADDRESS
EXPANSION TAG STORING AREA
VLAN TAG
ETHERNET ATTRIBUTE INFORMATION
PAYLOAD
FCS
2201
2202
2301
2203
2204
2205
2206
FORWARDING TAG
FORWARDING TAG
2500-1
2500-2

FIG. 35


2500-1
FORWARDING TAG
2500-2
FORWARDING TAG
2601-1
EXPANSION TAG IDENTIFICATION AREA
2602-1
EXPANSION TAG INFORMATION AREA
2601-2
EXPANSION TAG IDENTIFICATION AREA
2602-2
EXPANSION TAG INFORMATION AREA
2901-1
ADDRESS TYPE AREA
2902-1
ADDRESS AREA
2901-2
ADDRESS TYPE AREA
2902-2
ADDRESS AREA
FORWARDING TAG 2500-1
STORE THE DOMAIN IDENTIFIER
FORWARDING TAG 2500-2
STORE THE NODE IDENTIFIER